Chapter 4
Affected Environment

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This chapter describes the environment of the areas potentially affected by the alternatives considered in this Draft EIS. It provides information on existing environmental resources, including any sensitive features, and the social and economic setting at and surrounding the Project LOD, as described in Section 3.3.1.1. The geographic parameters used to identify and describe the affected environment are based on the likelihood resources within this area could be affected by at least one of the alternatives, and would vary by environmental topic. For certain topics, this area would encompass a generalized area surrounding the LOD with no specific boundaries, such as land use. However, for other topics the study area would have specific delineations, including that of the LOD to determine "footprint" impacts such as tree displacements. The environmental impacts of the Project on these resources are discussed in Chapter 5.

As described in Section 1.2, the Virginia Avenue Tunnel is approximately 3,800 feet in length and is beneath eastbound Virginia Avenue SE from just west of 2nd Street SE (west portal) to 9th Street SE, Virginia Avenue Park, and the 11th Street Bridge right-of-way between 9th and just east of 11th Streets SE (east portal). The tunnel contains a single railroad track and does not have the minimum 21 feet vertical clearance to allow the operation of double-stack intermodal freight trains. The tunnel is an integral part of CSX's freight rail network to carry goods across Mid-Atlantic and Midwest states.

4.1 Land Use

4.1.1 Existing Land Uses

The Project is located in the southeast quadrant of the District of Columbia in the Capitol Hill community. Capitol Hill encompasses portions of both the District's southeast and northeast quadrants, extending east from the U.S. Capitol to the Anacostia River along the southeast and east edges and to H Street NE and Benning Road NE along its north edge. Capitol Hill contains a wide range of mixed land uses, including retail, office, and commercial businesses; residential uses; industrial uses; and government properties and buildings. The "Hill" is also characterized by its 19th and 20th century brick row houses, which led to the creation of a district that was placed on the National Register of Historic Places (see Section 4.10 for further information). Despite the preservation of these historic row houses (many of which were converted from residential to commercial uses), substantial land use changes have occurred over the past several decades. These include, most prominently, the construction of the Southeast-Southwest Freeway (I-695), which bifurcated the community and now presents the dominant visual characteristic along the Virginia Avenue SE (see photograph). In general, the land uses on the north side of I-695 have retained their historical characteristics. The land uses on the south side, however, have been subject to large scale redevelopment that eliminated most of the original structures and buildings.

Figure 4-1 shows the existing land uses surrounding the LOD. Descriptions of these land uses categorized by governmental, institutional, industrial, residential, commercial and recreation are provided below.

Government

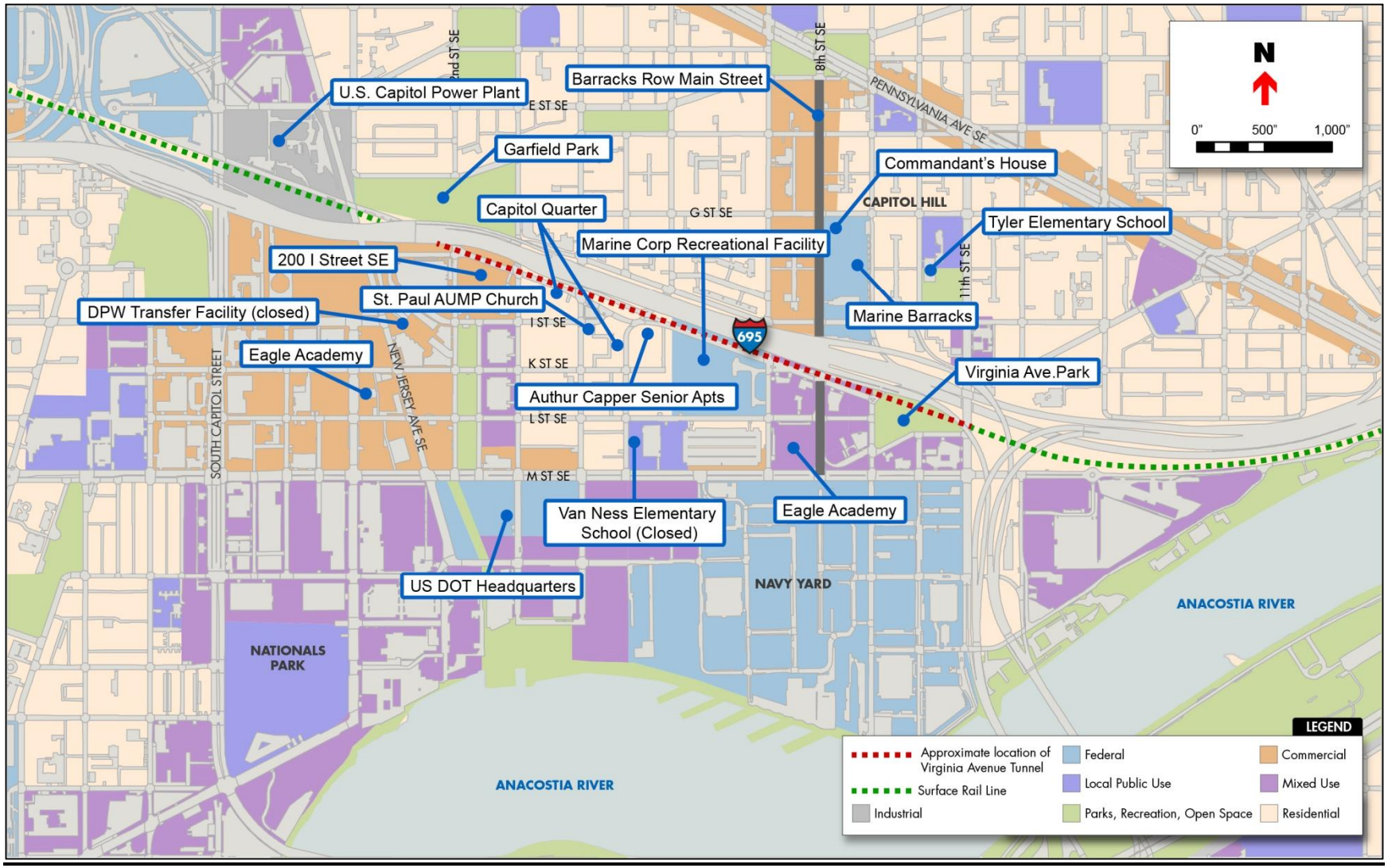
A number of federal facilities are located near the LOD, such as the Washington Navy Yard, the Marine Barracks, and the U.S. Department of Transportation headquarters.

I-695 Viaduct & Virginia Ave. SE, Looking East at 7th Street SE

The 70-acre Washington Navy Yard employs approximately 10,000 Navy employees and 5,000 private contractors. It is the headquarters of Naval District Washington (NDW) and supports a variety of activities (Washington, DC Marketing Center, 2004). The NDW functions as the military coordinator for most of the U.S. Navy units in the Washington, Northern Virginia, and Maryland areas. The U.S. Department of the Interior has designated the Washington Navy Yard as a National Historical Landmark.

The Marine Barracks – the oldest active post in the U.S. Marine Corps -- is located at 8th and I Streets SE. The Barracks supports both ceremonial and security missions within the District. The Barracks is located north of the Southeast/Southwest Freeway along 8th and 9th Streets. The Commandant's House, still standing at the north end of the Barracks, was completed in 1806 and is the oldest public building in continuous use in the nation's capital. The remaining Barracks were rebuilt between 1900 and 1907. Both the Marine Barracks and the Commandant's House were placed on the National Register of Historic Places by the U.S. Department of the Interior in 1976. The Barracks have been expanded to accommodate new housing for 300 Marine personnel, as well as a public park and recreational facilities open to the public (National Capital Planning Commission [NCPC], 1997). These newer facilities, located at 1009 7th Street SE, include bachelor enlisted quarters, the Marine Band practice hall, personnel support, Marine Barracks Turf Field and other recreational facilities.

Figure 4-1
Existing Land Uses



The U.S. Department of Transportation (U.S. DOT) headquarters building, located at 1200 New Jersey Avenue SE, is comprised of two buildings on 11 acres with 1.35 million square feet of office space. The U.S. DOT relocated its headquarters from L'Enfant Plaza to its current location in 2007. The new headquarters is located at the corner of the "Yards", a mixed-use development at the Southeast Federal Center.

In addition to these federal facilities, the Government of District of Columbia also operates facilities near the LOD. Among them is the building located at 200 I Street SE. This building, with the former address of 225 Virginia Avenue SE, began as a printing plant for the *Washington Star* and then the *Washington Post*. After several false starts to convert the building, the Government of the District of Columbia purchased the building and converted the building into new offices for the District of Columbia Child Family Services Agency, the Office of the Chief Technology Officer and the Commission on the Arts and Humanities.

The DC Department of Public Works (DPW) recently closed a refuse transfer facility at 900 New Jersey Avenue SE, and the DC Housing Authority is planning to build housing on this property. This project will also include connecting I Street SE between New Jersey Avenue SE and 2nd Street SE to complete a portion of the street grid. The north side of the I Street SE extension is currently being developed into a four-building mixed use project, which requires a portion of the transfer building site.

Institutional

This category includes land and facilities occupied by schools, hospitals, religious organizations and similar institutions. A number of schools are located near the LOD, including the Tyler Elementary School, Eagle Academy (2 locations), Capitol Hill Day School, and the former Van Ness Elementary School, which is planned to be re-opened. The District Public Schools (DPS) closed Van Ness Elementary, located at 5th and M Streets SE, in 2006 because of a lack of school-age children in the neighborhood (due to the closing of the former Capper/Carrollsburg public housing project). The DPS continues to use the school building for administrative offices until such time as the neighborhood has enough elementary students to warrant re-opening the school, possibly as early as the 2015 school year.

Several churches are also located near the LOD including the St. Paul African Union Methodist Church, located at 401 I Street SE, which is listed on the National Register of Historic Places. There are no hospitals or public libraries in the vicinity of the LOD.

Industrial

This category includes areas characterized by manufacturing, warehousing, wholesale and distribution centers; roads, streets, alleys and other transportation rights-of-way; vehicle storage/maintenance yards; railroad corridors; and similar uses. As a largely residential, commercial, governmental and office community, Capitol Hill contains very few industrial land uses. The U.S. Capitol Power Plant is one of the exceptions. Located near the intersection of

South Capitol Street and E Street SE, the power plant has been in continuous service since 1910. Originally providing both steam and electricity to the 23 buildings in the Capitol Hill area, the electrical generation was decommissioned in 1952. From then on, the reconfigured power plant provides steam and chilled water.

Residential

The District of Columbia contains eight Wards. The Project is in the District's Ward 6. Neighborhoods in Ward 6 are characterized predominantly by moderate-density residential development. As noted in Figure 4-1, residential land uses dominate the areas north of I-695, including social services and community facilities serving the residential areas. In addition to federal buildings and facilities, Capitol Hill is the largest residential historic district in the District with many of its 19th and 20th century row houses listed on the National Register of Historic Places. The Capitol Hill Historic District generally extends from Virginia Avenue SE on the south; South Capitol Street and 2nd Street NE on the west; and F Street NE on the north; and 13th and 14th Streets SE and NE on the east (see Section 4.11 for further information). Although residences near the LOD have market values over the $1 million range, clusters of low income housing, including public housing, are spread throughout the community.

In 2001, the District received a $34.9 million Hope VI grant to redevelop the 23-acre Capper/Carrollsburg public housing site as a mixed-use community with over 700 townhouses, 700,000 square feet of office space, and 50,000 square feet of retail space. Construction on Phase I (a townhouse development called "Capitol Quarter") was completed in the summer of 2010 and is located between 3rd and 5th Streets SE, Virginia Avenue SE, and L Street SE. Phase II, which is located in the blocks between 3rd and 4th Streets SE and I and L Streets SE, was completed in 2012. In total, both phases of Capitol Quarter contain about 320 residential units, most of which are single-family townhouses. The community contains several three-unit apartment buildings as low-income rentals, but these buildings are not readily discernible from the rest of the community.

Arthur Capper Senior Apartments, also part of the Capper/Carrollsburg redevelopment, is an approximately 142,000 square foot affordable senior housing development with 162 units located at the corner of Virginia Avenue SE and 5th Street SE. Also known as "Capper #1," this residential building complements a second senior apartments building with 139 units located on 400 M Street SE, which is known as "Capper #2." The second Seniors Apartments building was completed in 2005.

Commercial

The historic Barracks Row Main Street is the oldest commercial corridor in the city, extending along 8th Street SE from Pennsylvania Avenue SE to the Washington Navy Yard along M Street SE (see Figure 4-1). The portion of 8th Street SE north of I-695 is densely aligned with bars, boutiques, restaurants, and other similar commercial venues. South of I-695, the corridor is less consistent but contains a large concentration of historic structures. Although there are a

few small shops and eating establishments along this stretch, the urban environment is more institutional (charter school) and governmental (Navy Yard).

Recreational Facilities

Two public parks are located within or near the LOD—Virginia Avenue Park and Garfield Park – as are several recreational facilities including the Marine Barracks Turf Field. Section 4.12 contains more information about the parks and recreational facilities in the general vicinity of the LOD.

4.1.2 Land Use and Transportation Plans, Policies and Controls

Existing and future land uses and transportation facilities are controlled by a number of federal, District of Columbia, and other governmental plans, policies and controls. Those relevant to the Project are described in this section.

4.1.2.1 Federal

The National Capital Planning Commission (NCPC) is responsible for long-range planning for federal elements within the District and surrounding counties.

The *Comprehensive Plan for the National Capital* (2004) guides future planning and development for the District and the national capital region. The Comprehensive Plan consists of two parts: Federal Element and District Element. The Federal Element, which is prepared by the NCPC, provides a policy framework for the federal government in managing its operations and activities regarding transportation, federal workplace, parklands, and other related topics. The District Element is described in Section 4.1.2.2.

4.1.2.2 District of Columbia

Comprehensive Plan

The Comprehensive Plan's District Element, prepared by the District's Office of Planning in 2006, includes traditional city planning issues such as land use, housing, and economic development. The District Element is further separated into two parts:

1. The Citywide Elements – Addresses land use, transportation, housing, economic development, educational facilities, historic preservation and other topics that affect the city as a whole.
2. The Area Elements – Addresses the local issues and priorities within 10 geographic areas (and related neighborhoods, business districts, landmarks, etc.) that comprise the District. The Project is located in the Lower Anacostia Waterfront/ Near Southwest Areas.

Table 4-1 presents the elements of the Comprehensive Plan that are relevant to the Project.

The *Anacostia Waterfront Framework Plan* (2003) completed by the District Office of Planning (OP) in cooperation with the Anacostia Waterfront Initiative, envisions a dramatically redeveloped area with a substantial increase in housing, retail, offices and parks; M Street transformed into a vibrant mixed-use corridor; and the extension of existing streets to the Anacostia River.

Table 4-2 presents the goals for future land use for the Near Southeast area.

Table 4-1
Comprehensive Plan Goals Relevant to the Project

Land Use Goal
Ensure the efficient use of land resources to meet long-term neighborhood, citywide, and regional needs; to help foster other District goals; to protect the health, safety, and welfare of District residents and businesses; to sustain, restore, or improve the character and stability of neighborhoods in all parts of the city; and to effectively balance the competing demands for land to support the many activities that take place within District boundaries." (District Element)
Transportation Goal
"Create a safe, sustainable, efficient multi-modal transportation system that meets the access and mobility needs of District residents, the regional workforce, and visitors; supports local and regional economic prosperity; and enhances the quality of life for District residents." (District Element)
Parks Recreation and Open Space Goal
"Preserve and enhance parks and open spaces within the District of Columbia to meet active and passive recreational needs, improve environmental quality, enhance the identity and character of District neighborhoods, and provide visual beauty in all parts of the national capital." (District Element)
Environmental Protection Goal
"Protect, restore, and enhance the natural and man-made environment in the District of Columbia, taking steps to improve environmental quality, prevent and reduce pollution, and conserve the values and functions of the District's natural resources and ecosystems." (Federal Element)
Urban Design Goals
"Enhance the beauty and livability of the city by protecting its historic design legacy, reinforcing the identity of its neighborhoods, harmoniously integrating new construction with existing buildings and the natural environment, and improving the vitality, appearance, and security of streets and public spaces." (District Element) "Preserve and enhance the unique cultural heritage, beauty, and identity of the District of Columbia by respecting the historic physical form of the city and the enduring value of its historic structures and places, recognizing their importance to the citizens of the District and the nation, and sharing mutual responsibilities for their protection and stewardship". (District Element)

Source: National Capital Planning Commission, Comprehensive Plan for the National Capital – Federal Element (2004)
District of Columbia, Office of Planning, Comprehensive Plan for the National Capital – District Element (2006)

Table 4-2
Goals for the Near Southeast Area

Land Use Goals
Development Goal of 10,000 residential units; and 15 million square feet of commercial/office space.
"…A significant increase in residential density, concentrated primarily in the Hope IV development [now Capper/Carrollsburg], at the SEFC [Southeast Federal Center] waterfront, around the Canal Blocks, at the eastern end of M Street, and along 8th Street."
Transportation Goal
"The existing bridges that cross the Anacostia River must be redesigned to serve as great works of urban infrastructure. Reducing the traffic load on existing bridges and avenues is critical for urban design improvements, park access, and economic growth in the area; indeed, for residents' quality of life."
Parks, Recreation and Open Space Goals
Development Goal of 60 acres of open space.
Proposed Canal Blocks Park [now Washington Canal Park]; a waterfront park at the SEFC; and a riverwalk "that will provide 1.8 miles of continuous, publicly accessible shoreline in the Near Southeast."
Urban Design Goals
"Office development combined with street-level retail is encouraged along M Street [SE] to create a pedestrian-friendly, urban boulevard."
"The Framework recommends the extension of New Jersey Avenue, 3rd Street, and 4th Street [SE] through the SEFC site to facilitate public access to the waterfront."
"Virginia Avenue should serve as a greenway to link Capitol Hill, Garfield Park, and the new Marine Barracks playing field to a gateway where Virginia Avenue meets the Anacostia waterfront."

Source: District of Columbia, Office of Planning, Anacostia Waterfront Initiative, *Anacostia Waterfront Framework Plan* (2003)

Subarea Plans

Nine subareas are located in Ward 6. OP and DDOT are among the various local entities responsible for the planning of these subareas (see Table 4-3).

The plans for these nine subareas recommend continuing revitalization to achieve the land use and urban design goals contained in these plans. Notable initiatives of these plans include:

- Renovating existing dilapidated areas into pedestrian-friendly, mixed-use developments and activities that serve as destinations with a sense of place and that support the needs of the surrounding community;
- Addressing parking and circulation issues; and
- Preserving the historical context of districts and structures.

Table 4-3
Subareas in the General Vicinity of Project

Subarea	Planning Entity
Marine Barracks	Capitol Hill Business Improvement District
Canal Park	Office of the Deputy Mayor for Planning and Economic Development (DMPED)
Washington Navy Yard	U.S. Department of Defense
Southeast Federal Center	Anacostia Waterfront Initiative (Office of Planning)
M Street	District Department of Transportation (M Street Transportation Study)
Capper/Carrollsburg	Office of Planning
South Capitol Gateway	
8th Street SE Historic Area	
WASA Pump Station Area	

Source: District of Columbia, Office of Planning.

4.1.2.3 Other Governmental Plans and Actions

Mid-Atlantic Rail Operations Studies

The 2002 *Mid-Atlantic Rail Operations – Phase I Study* (MAROPs Phase I) examined rail choke points and how they affect the capacity of the rail system serving Mid-Atlantic States. The MAROPs were the joint effort of the I-95 Corridor Coalition, which included the states of New Jersey, Pennsylvania, Delaware, Maryland, and Virginia, and three railroad companies: AMTRAK, CSX and Norfolk Southern. The MAROPs Phase I identified the Virginia Avenue Tunnel as a rail choke point and recommended reconstructing the tunnel and adding tracks to eliminate conflicts between CSX and passenger trains. As noted in Section 1.2, passenger trains do not use Virginia Avenue Tunnel. However, they do share the same tracks as freight trains west of 2nd Street SW junction, which is located one-half-mile from the Virginia Avenue Tunnel's western portal. At this junction, the rails split: east and north bound freight trains proceed towards Virginia Avenue Tunnel and east and north bound passenger trains proceed toward Union Station via a tunnel beneath the U.S. Capitol Grounds. A west bound freight train could force a freight train moving in the opposite direction to stop near this junction, which could also delay passenger trains as well. MAROPs Phase I noted that providing a two-track Virginia Avenue Tunnel would benefit both regional freight rail and passenger system efficiency. The 2009 MAROP's Phase II listed the reconstruction of Virginia Avenue Tunnel as a priority project (top 150 out of 217 projects).

Anacostia Waterfront Initiative

The Anacostia Waterfront Initiative (AWI) integrates a number of transportation, land use and economic development projects within the area surrounding the Anacostia River. The

Anacostia Waterfront Initiative Framework Plan (OP, 2003) focused on eight areas within which to redevelop nearly 50 acres of neglected waterfront. The AWI envisions replacing parking lots and underutilized streets with a vibrant mix of new public plazas, cultural venues, restaurants, shops and residences. The proposed program recommends more than two million square feet of new construction including 14 acres of new parks and public open space along the waterfront. The proposed projects include:

- The Southwest Waterfront with Market Square and Civic Park
- South Capitol Street Bridge and Gateway (in progress—the Nationals Park, a Major League baseball stadium, was not included in the original plan, but was incorporated and is consistent with the Plan)
- Southeast Federal Center and Waterfront Park
- Capper Carrollsburg Hope VI Redevelopment and Canal Blocks Park (Phase I complete; Park to open in 2012)
- Reinvestment at East of the River Gateways (i.e. South Capitol and 11th Street Bridges)
- Kingman Island Nature Center
- Waterfront Light Rail Line (now Anacostia Initial Line Segment Streetcar)
- Anacostia Riverwalk and Trail (in progress)
- The Long-Term Control Plan (upgrading of the sewer system) (in progress)

Metropolitan Washington Council of Governments (MWCOG) Long-Range Transportation Plan

The National Capital Region Transportation Planning Board (TPB), a part of the Metropolitan Washington Council of Governments (MWCOG), is the federally-designated Metropolitan Planning Organization for the region. The TPB prepares the *National Capital Region's Financially Constrained Long-Range Transportation Plan* (CLRP) which identifies all regionally important transportation projects and programs that are planned in the Washington Metropolitan Area between 2012 and 2040. In the 2012 update, CLRP identified the following projects in the general vicinity the Project:

- Highway Improvements:
  - 11th Street Bridges reconstruction,
  - Southeast Boulevard, convert the segment of the Southeast Freeway from 11th Street Bridge to Barney Circle to an urban boulevard,
  - South Capitol Street Corridor, bridge reconstruction, including interchange at Suitland Parkway and Martin Luther King Jr. Blvd.;
- Bicycle and Pedestrian Improvements:
  - Garfield Park Canal Park 2nd Street SE, Shared-Use Path,
  - 11th Street SE Bridges and Intersection; and
- Freight Improvements: Virginia Avenue Tunnel project.

Transportation Improvement Program

The *Transportation Improvement Program* (TIP) is a six-year program, updated biannually, that describes the time period in which federal funds should be obligated to state and local projects. The *FY 2013-2018 Transportation Improvement Program* (MWCOG, July 18, 2012) includes the

Virginia Avenue Tunnel Project. The project is listed as using private funds. Other notable TIP projects that would be located in the general vicinity of the LOD:

- District-wide Bicycle and Pedestrian Management Program – The goal of this project is to increase the safety and convenience of bicycle and pedestrian travel. It includes the widening of existing routes, curve realignment, grade reduction, and signage and lighting upgrades.
- Garfield-Canal Park Connector – This project would establish an Americans with Disabilities Act (ADA)-compliant pedestrian and bicycle connection beneath I-695 that will link Garfield Park and Canal Park along the 2nd Street SE right-of-way. The project also aims to beautify the civic space beneath the interstate.
- Southwest Freeway (I-695) over S. Capitol Street – This project would remove and replace bridge deck and general structural upgrades.
- South Capitol Street Corridor – Full replacement and realignment of the Frederick Douglass Memorial Bridge and interchanges. Boulevard streetscape treatments along South Capitol Street from between N Street and I-695 and along New Jersey Avenue between I-695 and M Street SE.

South Capitol Street Project

The South Capitol Street Corridor Project will transform the street from an urban freeway into a boulevard while improving safety, multi-modal transportation mobility and community access that will support economic development. Key elements of this project include:

- New Frederick Douglass Memorial Bridge across the Anacostia River;
- New at-grade traffic circle at Suitland Parkway;
- Reconstructed Suitland Parkway/I-295 interchange;
- New Martin Luther King Jr. Boulevard and Suitland Parkway interchange;
- New traffic oval connecting South Capitol Street, Potomac Avenue and Q Street SE;
- Reconstructed South Capitol Street as a six-lane boulevard with an improved streetscape from the oval to Independence Avenue
- Conversion of M Street SE from a grade-separated to an at-grade intersection; and
- Improved bicycle and pedestrian facilities throughout the corridor.

11th Street Bridges Project

The 11th Street Bridges Project, currently under construction, will replace two existing bridges with three new bridges and improve the associated interchanges. When completed, the project will:

- Improve mobility by providing separate freeway and local traffic connections to both directions of the bridge and local streets on both sides of the Anacostia River;
- Provide a shared path for pedestrians and bicycles, as well as rails to allow future streetcar connections;
- Replace the existing functionally deficient and structurally obsolete bridges;
- Provide an additional alternate evacuation route from our Nation's Capital; and
- Include new trail connections, improved drainage and other environmental investments.

DC Water Projects

DC Water has several planned projects, as well as those currently under construction, including a combined sewer overflow (CSO) tunnel under the Anacostia River. According to the DC Water, a third of the District has a combined sewer system, made up of storm water and sanitary sewage. During normal operations, storm water and sanitary sewage flow into the sewer and ultimately to the Blue Plains Advanced Wastewater Treatment Plant. During heavy rain the combined sewer system could become overloaded and untreated sewage could be discharged into the Anacostia and Potomac Rivers. The purpose of the CSO tunnel is to capture this overflow and store it until after the storm event. The CSO tunnel is part of the Clean Rivers Project, a $2.6 billion effort that also includes a future diversion tunnel beneath M Street SE that will divert overflow storm water / sanitary sewage from existing CSO tunnels to the CSO tunnel under the Anacostia River.

Marine Corps Barracks

The Marine Corps Barracks, located just north of I-695 has been at its present location since the 19th Century. One of the newer buildings (Building 20), located between I Streets SE and I-695 and is used as quarters for Marines, is considered vulnerable to terrorist activities and retrofitting at the present location is not considered feasible. Therefore, the Marine Corps decided to relocate the barracks to another location in the neighborhood (in proximity to the Marine Barracks located between 8th and 9 Streets SE), and is considering several locations that are near the LOD. The Marine Corps worked with the community to develop a Community Integrated Master Plan to select possible sites for the marine quarter's relocation.

4.1.3 Zoning

Zoning regulations, administered by the District of Columbia Office of Zoning (DCOZ), control land use, density, height, and bulk characteristics of property in the District. Figure 4-2 illustrates the zoning in the immediate vicinity of the LOD, and Table 4-4 describes the zoning codes. The majority of the area near the Project is currently zoned for commercial and residential uses, although large areas remain un-zoned.

The area surrounding the Project includes three overlay zones that further modify allowable development. The overlay zones establish the use, height, density (including incentives for bonus density and height), combined lot development, and design requirements for a mixture of residential and commercial development.

Figure 4-3 illustrates the following overlay districts in the vicinity of the Project: Eighth Street Southeast Neighborhood Commercial District, the Southeast Federal Center Overlay District, and the Capitol Gateway Overlay District.

Table 4-4
Zoning Code Descriptions for Parcels Immediately Adjacent to the Project

Zone	Description
C-3-A	Permits matter-of-right development for major retail and office uses to a maximum lot occupancy of 75 percent for residential use, a maximum FAR of 4.0 for residential and 2.5 FAR for other permitted uses, and a maximum height of 65 feet.
C-3-C	Permits matter-of-right development for major business and employment centers of medium/high-density development, including office, retail, housing, and mixed uses, to a maximum lot occupancy of 100 percent, a maximum FAR of 6.5 for residential and for other permitted uses, and a maximum height of 90 feet.
C-M-1	Permits development of low bulk commercial and light manufacturing uses to a maximum FAR of 3.0, and a maximum height of three stories/40 feet with standards of external effects and new residential prohibited.
C-M-2	Permits development of medium bulk commercial and light manufacturing uses to a maximum FAR of 4.0 and a maximum height of 60 feet with standards of external effects and new residential prohibited.
CR	Permits matter-of-right residential, commercial, and certain light industrial development to a maximum lot occupancy of 75 percent for residential use, a maximum FAR of 6.0 for residential and 3.0 for other permitted uses, and a maximum height of 90 feet. Residential recreation space is required.
R-5-B	Permits matter-of-right moderate development of general residential uses, including single-family dwellings, flats, and apartment buildings, to a maximum lot occupancy of 60 percent, a maximum FAR of 1.8, and a maximum height of 50 feet.
R-5-E	Permits matter-of-right high-density development of general residential uses, including single-family dwellings, flats, and apartment buildings, to a maximum lot occupancy of 75 percent, a maximum FAR of 6.0 for apartment houses and hotels and 5.0 for other structures, and a maximum height of 90 feet.

Note: FAR: Floor Area Ratio. A figure determined by dividing the gross floor area of a building(s) on a lot by the area size of that lot. The higher the FAR, the greater the density allowed on the lot.
Source: District of Columbia, Office of Zoning (updated November 5, 2010)

Figure 4-2
Zoning in the Immediate Vicinity of the Project

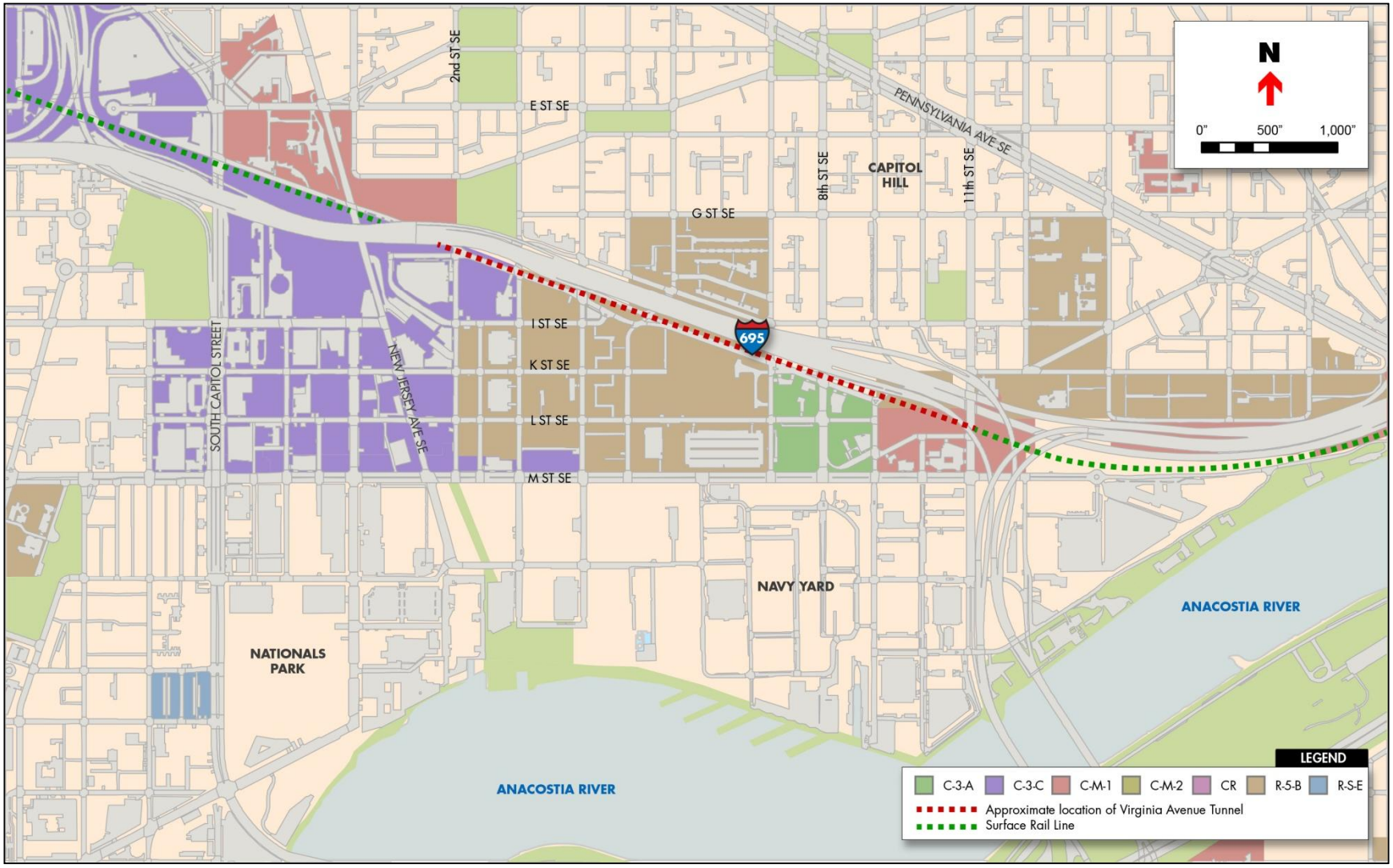
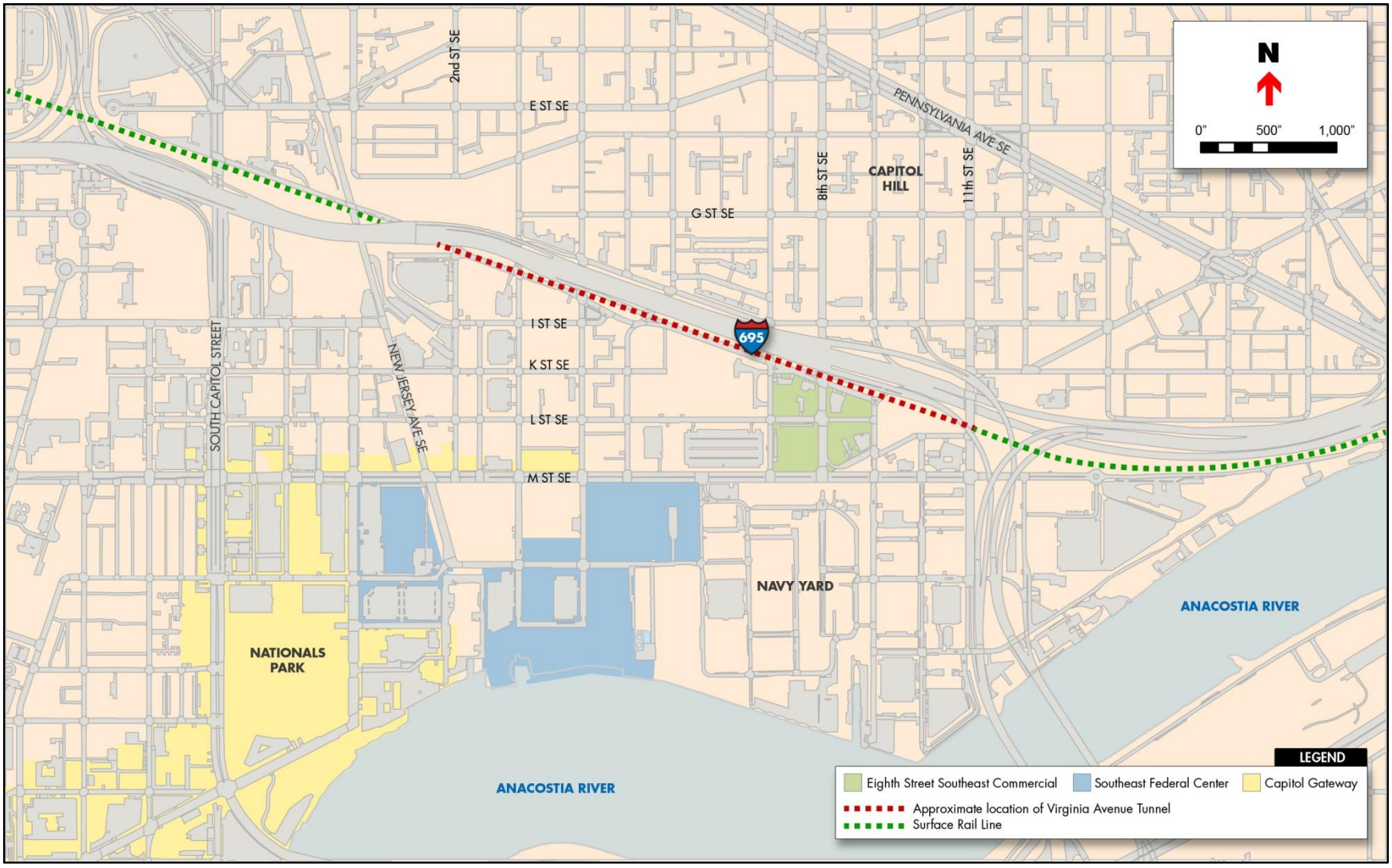


Figure 4-3
Overlay Districts near the Project



The Eighth Street Southeast Neighborhood Commercial Overlay District was established to encourage and allow new business and office development in close proximity to the Navy Yard, with emphasis on firms that will conduct business with the Navy. This overlay district is also intended to serve the neighborhood with retail and service businesses, allow and encourage medium density commercial development. Any development should respect the historic scale of buildings and the entrance to the adjacent Navy Yard and provide for safe and efficient pedestrian movement.

The Southeast Federal Center Overlay District was established to provide for the development of a vibrant, urban, mixed-use waterfront neighborhood, offering a combination of uses that will attract residents, businesses and visitors from across the District and beyond. The Capitol Gateway Overlay District was established to provide development incentives and design requirements to ensure an appropriate mixture and density of residential and commercial uses within the area surrounding South Capitol Street as a monumental boulevard.

4.2 Farmland

The Project is located in a highly urbanized area that has already been developed or designated as park land. Therefore, no active farms or commercial agricultural production are located near the LOD.

Virginia Avenue Park, which is located on the east end of the project site, contains the half-acre Virginia Avenue Community Garden, which was established in 2004 by volunteers with grant funding and partnerships between the non-profit organization operating the garden and the DC Department of Parks and Recreation. Although technically not a "farmland" due to its non-commercial aspects, the garden offers residents opportunities to grow herbs, vegetables and fruits. Each participating household is limited of two plots. For further information about Virginia Avenue Park, see Section 0.

4.3 Social and Community Conditions

4.3.1 Demographic Conditions

The U.S. Census Bureau provided year 2010 demographic data for the area in the general vicinity of Project. Figure 4-4 shows the relevant census blocks and census tracts. The census tracks extend far beyond the LOD, generally one-half mile to three-quarters of a mile on each side of Virginia Avenue SE. The pertinent census blocks encompass one or two blocks from Virginia Avenue SE. Basic demographic information, such as population, age, and race based on the 2010 Census is available at the block level. Employment and income information is only available on the census tract level. Tables 3-5 through 3-7 summarize the demographic information for the area surrounding the Project. For purposes of comparison, Tables 3-5 through 3-8 include the same information for the District. For descriptive purposes, U.S. Census Bureau terminology is used.

It should be noted that because Phase 1 of Capitol Quarter was not completed until 2010, the information contained in Tables 3-5 through 3-7 does not fully reflect the current residences of this neighborhood. At the time of the census count, many of the residences were not occupied, and therefore, the information in Tables 3-5 through 3-7 does not fully reflect the Capitol Quarter neighborhood as it exists today. In addition, the Marine Recreation Facility located on the south side of Virginia Avenue SE between 7th and 8 Streets SE contains Marine bachelor quarters. The Census information did not reflect this Marine population.

As noted in Table 4-5, approximately 1700 people live near the LOD, but this number is probably lower than the true number for the reasons noted immediately above. Nevertheless, in 2010 the share of white residents among this population was approximately 60 percent, more than 20 percentage points greater than the District overall. With the exception of Asians, all other racial groups, including blacks and Hispanic, were under-represented in comparison to the District overall.

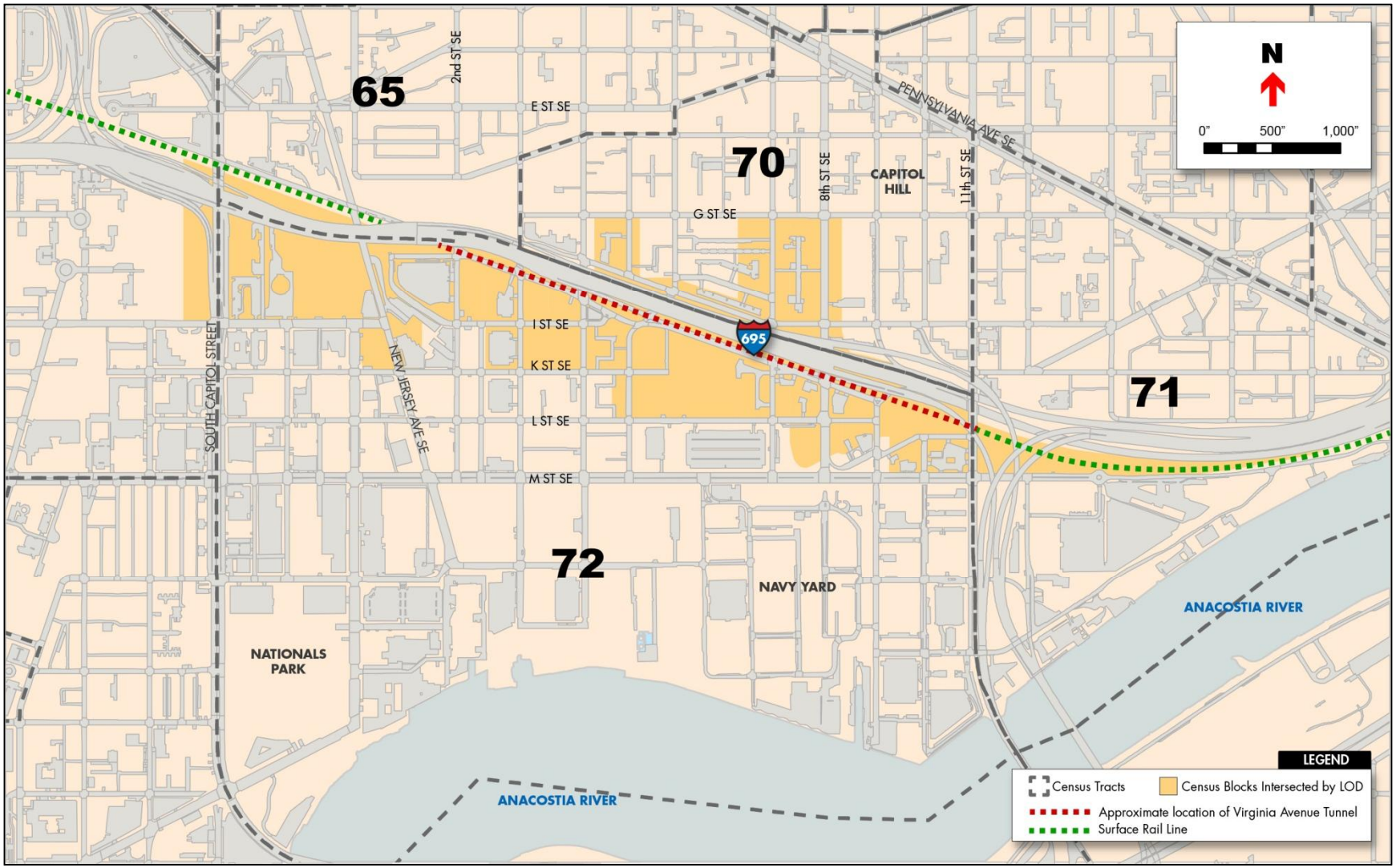
Table 4-5
Population by Race and Hispanic Origins in 2010

Category	District of Columbia		Area[1]	
	Number	Percent	Number	Percent
Total Population	601,723	---	1,693	---
White[2]	231,471	38.5	1,023	60.4
Black or African American[2]	305,125	50.7	473	27.9
Total Hispanic (all races)	54,749	9.1	81	4.8
American Indian & Alaska Native [2]	2,079	0.35	4	0.2
Asian[2]	21,056	3.5	62	3.7
Native Hawaiian/Other Pacific Islander	302	0.05	0	0
Some Other Race[2]	24,374	4.1	3	0.2
Two or More Races[2]	17,316	2.9	47	2.4
Total Minority	370,252	61.5	670	36.8

Notes: [1] Census blocks along LOD
[2] Not of Hispanic Origin
Data may not add up to 100 percent due to rounding.
Source: District of Columbia, Office of Planning. Population by Race and Hispanic or Latino Origin in DC - Census Block Group: 2010 (based on 2010 Census data).

In general, the age cohorts of the population living near the LOD are similar to that of the District overall, except those under 18 years of age (see Table 4-6). The percentage of people under 18 years of age in the area is one-third the percentages for the same cohort for the rest of the District, suggesting fewer households as percentage with children. However, due to the development of Capitol Quarter, which consists of single-family row houses, a larger

Figure 4-4
Census Blocks and Tracks near the Project



percentage of households with children would be expected. In terms of the gender, the male/female ratio among the residents living in the four census tracts shown on Figure 4-4 was 46.4:53.6. This was not substantially different than the District overall, which had a male/female ratio of 47:53 in 2010. In terms of those living near the LOD, this ratio is likely to favor males over females due to the bachelor quarters located at the Marine Recreation Facility. However, as noted above this population is not reflected in the 2010 Census.

Table 4-6
Population by Age in 2010

Age	District of Columbia		Area[1]	
	Number	Percent	Number	Percent
Total Population	601,723	---	1,693	---
Under 18 years	100,815	16.8	96	5.7
18-64 years	432,099	71.8	1,412	83.4
65 years and older	68,809	11.4	185	10.9

Notes: [1] Census blocks along LOD
Data may not add up to 100 percent due to rounding.
Source: 2010 U.S. Census Bureau

In terms of income and employment (see Table 4-7), the residents living in the four census tracks surrounding the LOD compares favorably against the District overall in some aspects but less favorably in others. The unemployment rate was lower than the District overall and the percent of household earning $100,000 and greater was higher as well. On the other hand, the percent of households earning less than $10,000 was more than double the percentage for the District overall, and the poverty rate was twice as high. Although Capitol Hill contains many high-priced housing units, it also contains several public housing developments, which could explain the comparatively high percentage of low-income households.

In terms of national origin (see Table 4-8), 90 percent of the residents living in the four census tracks surrounding the LOD were born in the United States (91.4 percent if including those born in a U.S. territory with at least one American parent), which was similar to the District overall, which was 85 percent. However, a much greater proportion of this U.S.-born population living in the four census tracts were born in other states as compared to the District overall: 64 versus 47 percent. With such a large U.S.-born population, it is not surprising that over 86 percent of the residents living in four census tracks surrounding the LOD speak English at home. The next most common language spoken at home is Spanish at almost five percent. These percentages are similar to the District overall, which had a slightly lower percentage of English-only speaking households and an about a two-point percentage higher number of household where Spanish is spoken. Similar to the area covered by the four census tracts, Spanish is the second most common language spoken at home in the District. Information about persons with disabilities was not available from 2010 Census.

Table 4-7
Employment and Income in 2010

Category	District of Columbia		Area[1]	
	Number	Percent	Number	Percent
Civilian Labor Force 16 years and over	328,036	---	5,639	---
Employed	297,189	90.6	5,176	91.8
Unemployed	30,847	9.4	463	8.2
Median Income (dollars)	58,526	---	78,814[2]	---
Total Households (Estimated)	257,317	---	4,441	---
Less than $10,000 (households)	12,497	4.9	553	12.5
$10,000 to $24,999 (households)	20,818	8.1	154	3.5
$25,000 to 49,999 (households)	51,090	19.9	489	11.0
$50,000 to 99,999 (households)	68,706	26.7	1,137	25.6
$100,000 to 199,999 (households)	51,459	20.0	1,440	32.4
$200,000 or more (households)	24,605	9.6	428	9.6
Population for Whom Poverty Status is Known	551,331	---	9,045	---
At or Below Poverty Level[3]	101,767	11.1	1,900	21.0

Notes: [1] Census tracks (4) surrounding the LOD
[2] Proportional average of means of the four Census Tracts surrounding the LOD
[3] U.S. Dept. of Health & Human Services Poverty Guideline
Source: 2010 U.S. Census Bureau

Table 4-8
National Origin in 2010

Category	District of Columbia		Area[1]	
	Number	Percent	Number	Percent
Born in United States	505,997	85.2%	9,039	90.0%
State (DC) of Residence	226,085	38.1%	2,649	26.4%
Different State	279,912	47.1%	6,390	63.6%
Born in U.S. Territory to American parent(s)	9,051	1.5%	142	1.4%
Foreign Born	78,907	13.3%	865	8.6%

Notes: [1] Census tracks (4) surrounding the LOD
Source: 2010 U.S. Census Bureau

4.3.2 Neighborhoods and Communities

The District of Columbia is divided into quadrants based on an area's geographic relationship to the U.S. Capitol. The District's local legislative branch, the Council of the District of Columbia, is comprised of representatives from eight Wards and five at-large seats. The eight wards are comprised of 37 Advisory Neighborhood Commissions (ANCs), with Commissioners elected to

their ANC by neighborhood Single Member Districts. This breakdown of land area into basic political units provides the basis for the more than 120 District neighborhoods to remain actively involved in policies and programs for which the District government has responsibility. The ANCs present their opinions and recommendations on issues such as transportation, recreation, economic development, and zoning, as well as the District's annual budget to the District government agencies, the executive branch, and the Council.

The Project is located entirely in Ward 6—a ward with diverse populations, housing styles, and neighborhood characteristics. For example, to the west, Ward 6 covers parts of Downtown and the Penn Quarter, Gallery Place and Chinatown, which are higher density land uses, whereas the eastern part of ward contains mostly lower density row houses. As noted in Section 4.1.2, the southern part of Ward 6 includes new developments as part of the Capitol Riverfront neighborhood, anchored by the Nationals Park.

Figure 4-5 identifies the ANCs and neighborhoods surrounding the LOD. Virginia Avenue SE straddles between two of these neighborhoods: Near Southeast / Washington Navy Yard and Capitol Hill.

The Near Southeast/Washington Navy Yard neighborhood consists of former industrial and military areas that are being transformed into residential and commercial properties while maintaining the historic military character. The Near Southeast neighborhood is home to the Washington Navy Yard which has been in continuous operation since 1799. It is currently the headquarters for Naval District Washington and provides support services and military housing for various entities within the Navy. It also contains the Naval Museum.

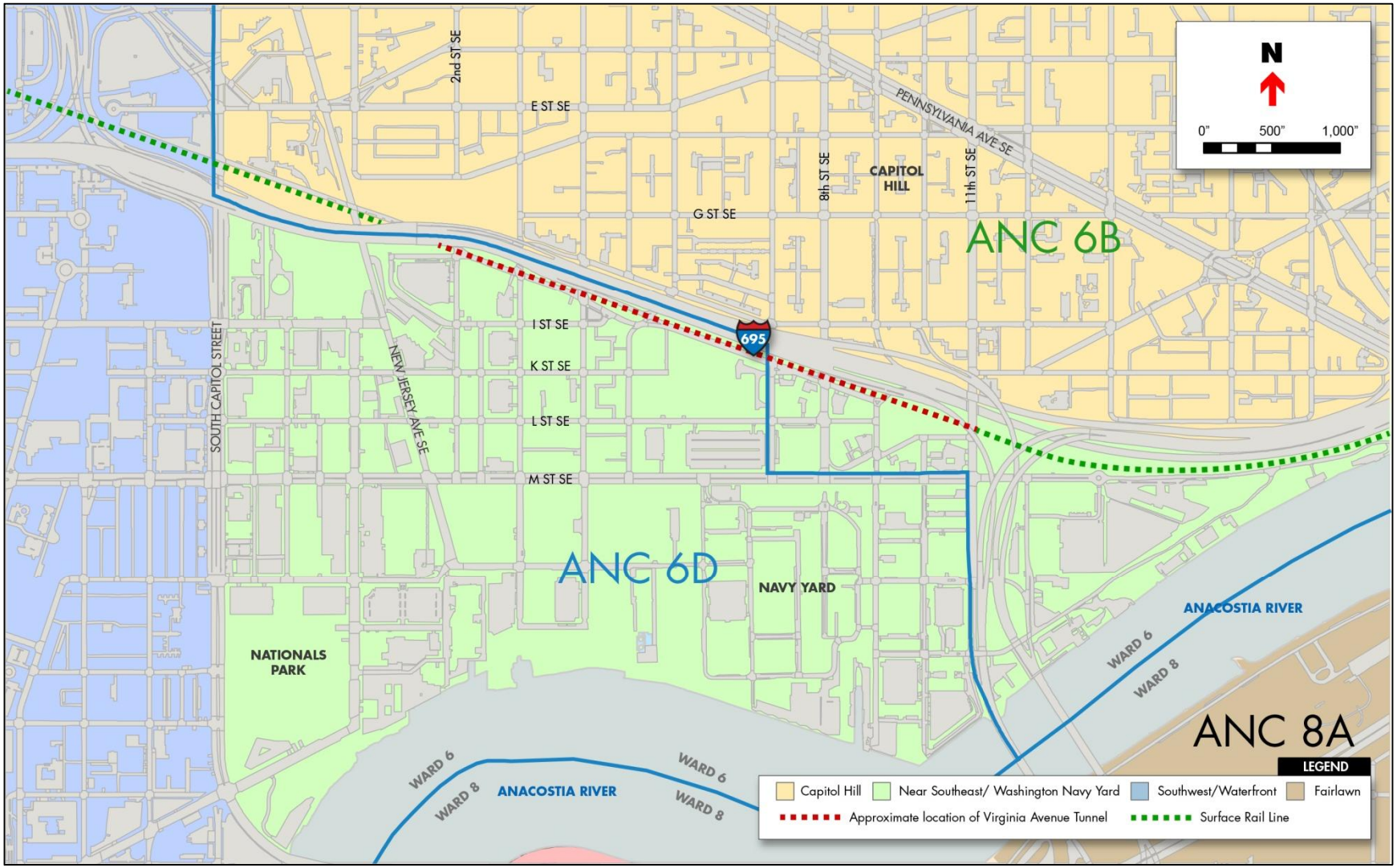
The Southwest neighborhood is located just west of the LOD. This neighborhood predominantly consists of residential and waterfront commercial properties.

The largest and most notable cluster of residences nearest to the LOD is Capitol Quarter, although there are a few residences interspersed along the south side of Virginia Avenue SE. Large clusters of residences, many of which are row houses of Capitol Hill, are located to the north of Virginia Avenue SE but are physically and visually separated from the LOD by I-695. As noted 3.1.2, Capitol Quarter occupies the blocks south of Virginia Avenue SE between 3rd and 5th Streets SE (see Figure 4-1). Phase I was completed in the summer of 2010, and Phase II was completed in 2012. The neighborhood consists of approximately 1,000 market-rate and workforce-rate rental and ownership units, and 50 Section 8 ownership units.

Adjacent to Capitol Quarter is the Capper Senior Apartments, an assisted living facility with approximately 160 apartments, located at the corner of Virginia Avenue, SE and 5th Street SE.

Other large residential communities in areas to the south of the LOD include the Capitol Riverfront (part of the Near Southeast Neighborhood), a mixed-use community stretching along one-and-a-half miles of river frontage. As noted in Section 4.1, many of the land uses along the Capitol Riverfront consists of government facilities, such as the Navy Yard, and the U.S. Department of Transportation Headquarters, but also includes the Nationals Park, a mixed of

Figure 4-5
Neighborhoods and Advisory Neighborhood Commissions near Project



housing, office and commercial buildings, and parks including waterfront parks, such as the Diamond Teague Park.

4.3.3 Public Facilities and Services

Figure 4-6 and Table 4-9 identify the emergency facilities, schools, religious facilities, social services located near the LOD. Brief descriptions of these facilities and services are provided below.

Emergency Response and Medical Services

The Project would be located within the First District of the Metropolitan Police Department. The Metro Police station, the First District Station, is located at the 100 block of M Street SW.

The District Fire and Emergency Medical Services Department provides fire and ambulance service for the entire District, including the parcels along Virginia Avenue SE. The Engine 7 Station, located at 1101 Half Street SW and Engine 18 Station, located at 414 8th Street SE, are nearest to the LOD. There are no nearby hospitals.

Educational, Social Service and Religious Facilities

Several educational, social service, and religious facilities are located near the LOD. The "Blue Castle", a historic trolley car barn (Washington & Georgetown Railroad Car House) built in the late 1800s (also see Section 4.11), contains the main campus of Eagle Academy Public Charter School. The Blue Castle is located on block south of Virginia Avenue SE. Other schools near the LOD include Capitol Hill Day School, an independent school teaching students from Pre-Kindergarten to Eighth grade, and the New Jersey Avenue campus of the Eagle Academy Public Charter School is located on 1017 New Jersey Avenue SE. Van Ness Elementary School is currently closed, but is planned to be re-openned, and Tyler Elementary School is located to the north of LOD on the other side of I-695.

Located within the Blue Castle, PSI Services, Inc. is a health and human services agency that provides training and treatment to individuals and families dealing with mental illness, developmental disabilities, abuse, and neglect. Other social services facilities near the LOD relate to housing for seniors and low-income residents. The Wheeler Creek Community Center houses a non-profit organization that provides public housing residents with support networks and resources to help them become self-sufficient.

St. Paul African Union Methodist Protestant (AUMP) Church is located along Virginia Avenue SE at the corner of 5th Street SE. The church is listed on the National Register of Historic Places (see Section 4.11.)

Figure 4-6
Public Facilities and Services

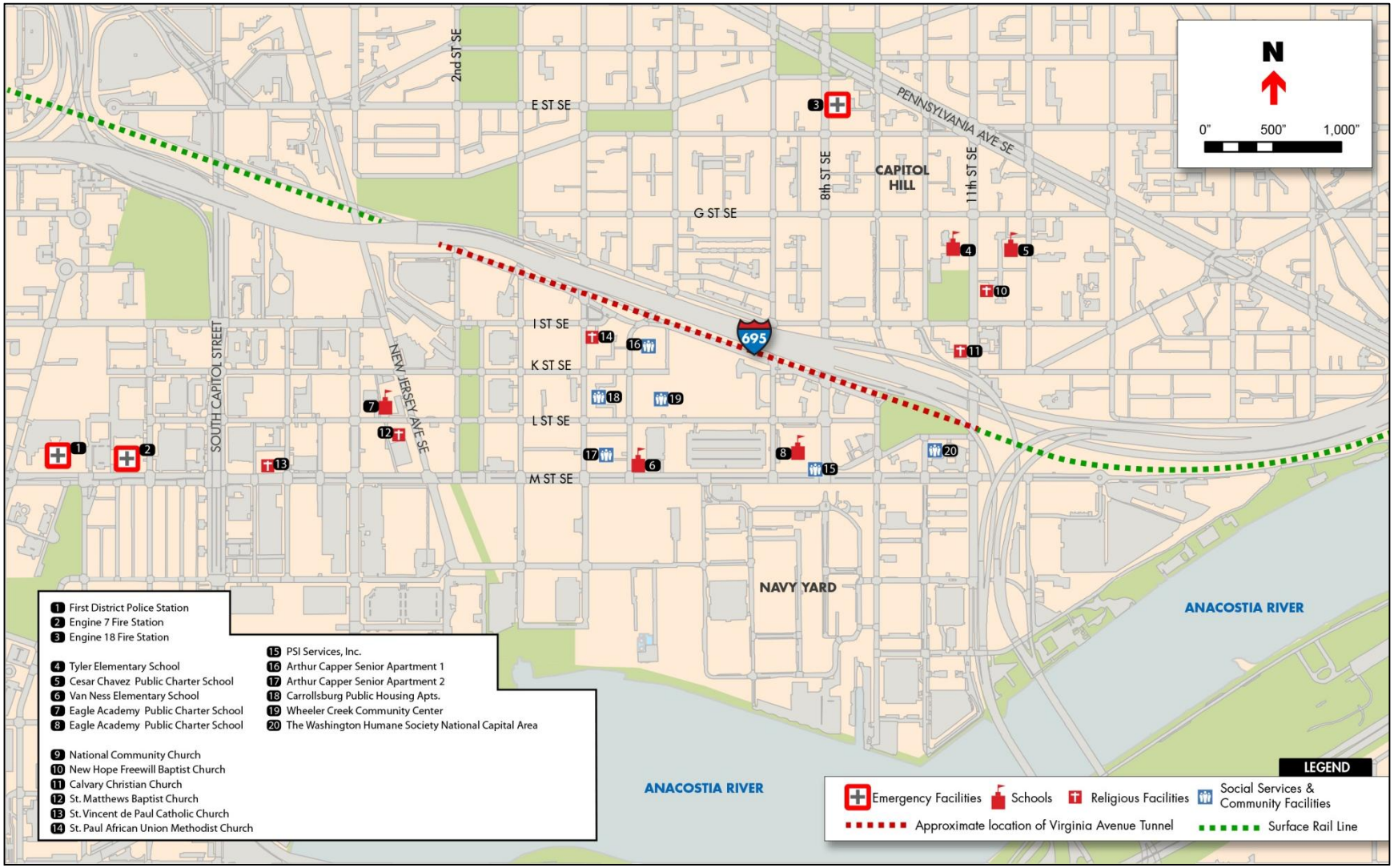


Table 4-9
Public Facilities and Services

Name	Location
Emergency Facilities	
First District Police Station	Southwest of LOD
Engine 7 Fire Station	Southwest of LOD
Engine 18 Fire Station	North of LOD
Schools	
Tyler Elementary School	Northeast of LOD
Cesar Chavez Public Charter School	Northeast of LOD
Van Ness Elementary School (closed)	South of LOD
Eagle Academy Public Charter School (New Jersey Avenue Campus)	Southwest of LOD
Eagle Academy Public Charter School (Main Campus)	South of LOD
Religious Facilities	
National Community Church (proposed)	Adjacent to LOD
New Hope Freewill Baptist Church	North of LOD
Calvary Christian Church	North of LOD
St. Matthews Baptist Church	South of LOD
St. Vincent de Paul Catholic Church	Southwest of LOD
St. Paul AUMP Church	Adjacent to LOD
Social Services and Community Facilities	
PSI Services, Inc.	South of LOD
Arthur Capper Senior Apartments 1	Adjacent to LOD
Arthur Capper Senior Apartments 2	South of LOD
Carrollsburg Public Housing Apts.	South of LOD
Wheeler Creek Community Center	South of LOD
The Washington Humane Society National Capital Area (Animal) Spay & Neuter Center	South of LOD

Note: See Figure 4-6 for locations of facilities and services.

4.3.4 Environmental Justice

Executive Order (EO) 12898, Federal Actions to Address Environmental Justice in Minority and Low-Income Populations, signed on February 11, 1994, requires federal agencies to take appropriate and necessary steps to identify and address disproportionately high and adverse human health or environmental effects of their actions on minority and low-income communities or populations. In addition, EO 12898 directs federal agencies not discriminate on the basis of race, color, or national origin and to "promote nondiscrimination in federal programs substantially affecting human health and the environment, and provide minority and

low-income communities access to public information on, and an opportunity for public participation in, matters relating to human health or the environment."

EO 12898 does not define the terms "minority" or "low-income." However, guidance provided by the Council on Environmental Quality (CEQ) describes these terms in the context of an Environmental Justice (EJ) analysis. The following definitions taken from the CEQ guidance are unique to EJ analysis and were used to identify minority and low-income populations living near the LOD:

Minority Individual. A Minority Individual is classified by the U.S. Census Bureau as belonging to one of the following groups: American Indian or Alaskan Native, Asian or Pacific Islander, Black (not of Hispanic Origin), and Hispanic. Minority Populations – According to the CEQ guidelines, should be identified where either (a) the minority population of the affected area exceeds 50 percent or (b) the minority population percentage of the affected area is meaningfully greater than the minority population percentage in the general population or other appropriate unit of geographic analysis.

Low-income Population. Low-income populations are identified where individuals have incomes below the U.S. Department of Health and Human Services poverty guidelines. A low-income population is either a group of low-income individuals living in proximity to one another or a set of individuals who share common conditions of environmental exposure or effect.

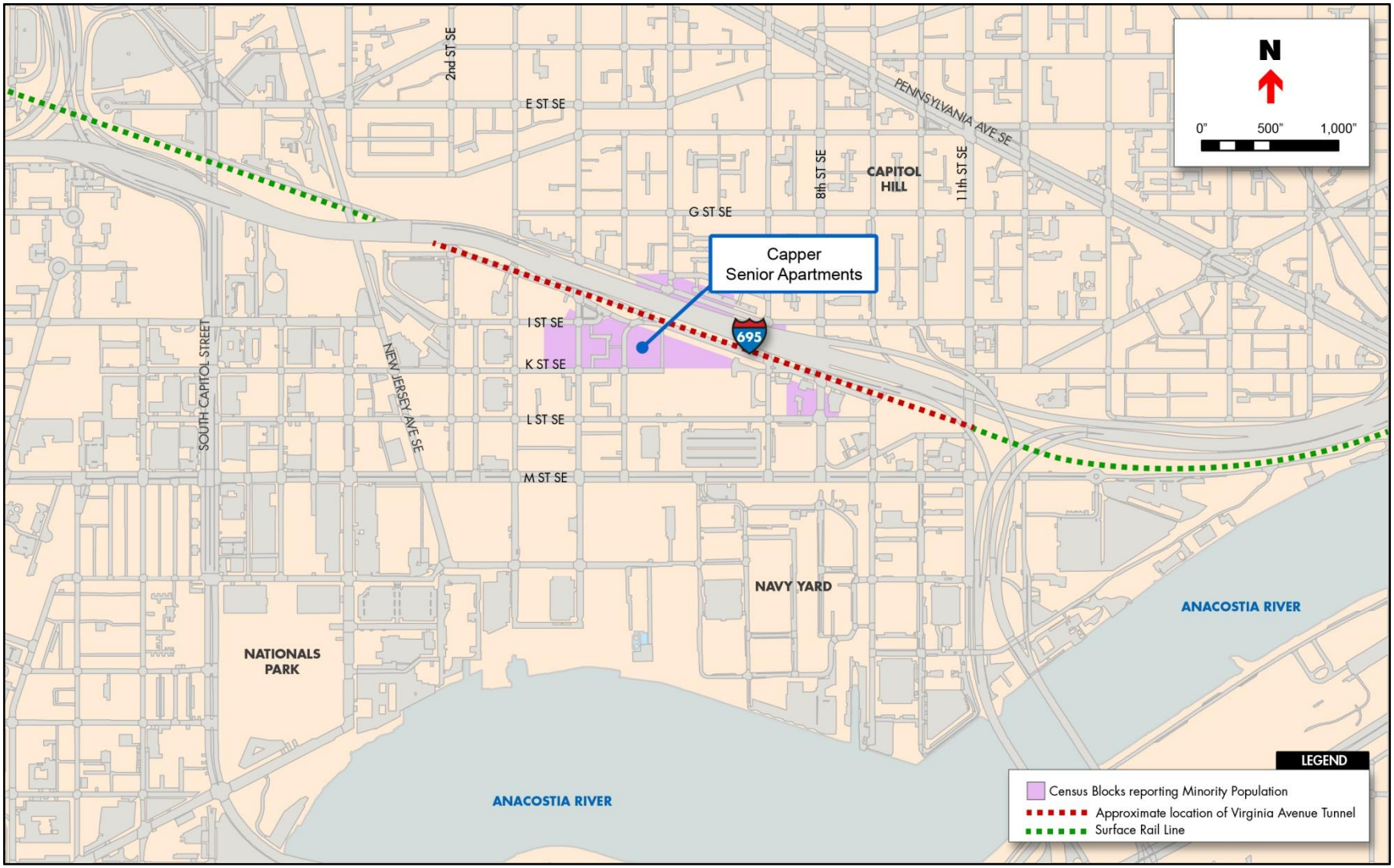
The EJ threshold for further analysis is met in either of the following cases:

- Census block groups where the minority or low-income population in the Census block group equals or exceeds 50 percent of the population in that census block group.
- Census block groups where the percentage of the minority or low-income population is at least 10 percent higher than the minority or low-income population percentage for the District of Columbia.
- Impacts to census block groups meeting the EJ threshold have the potential to be disproportionately borne by minority or low-income populations. The EJ analysis performed for this project focuses on these areas. No further EJ impact analysis is performed on the areas not meeting the EJ threshold.

Among the census blocks surrounding the LOD, 13 were found to meet the threshold that exceeded 50 percent minority population or was at least 10 percent greater than the percentage for the District of Columbia (61.5 percent). These census blocks are shown on Figure 4-7. The 2010 Census does not have income information on census block level, but does have income information on the census tract level. Although no census tracts were found to meet the threshold for low-income populations, this does not rule out the possibility of census blocks meeting this threshold.

It should be noted that the 2010 Census information does not reflect the current resident population of Capitol Quarter, the residential community that occupies the blocks to the south of Virginia Avenue between 3rd and 5th Streets SE, because this community did not exist at the time of the census. As noted in Section 4.3.3, Capitol Quarter is a new residential subdivision

Figure 4-7
2010 Census Blocks Reporting Minority Populations and Actual EJ Populations



that was developed in two phases, and contains mostly single-family row houses with market values upwards of several hundred of thousands of dollars.

Because Capitol Quarter was developed under the federal Housing and Urban Development HOPE VI program, it also contains affordable-priced row houses (re-sell restrictions apply) and low-income rental units managed by the District Housing Authority. Capitol Quarter Phase 1, which partially faces the LOD on the 300 and 400 blocks of Virginia Avenue SE but also extends south to L Streets SE between 4th and 5th Streets SE, contains ten low-income rental apartment buildings each containing three units (30 units total) and nine row houses that were sold to their owner-occupants as affordable-priced. Phase 2 contains a total of 47 affordable and rental units. The affordable row houses and low-income rental units are not clustered, but interspersed throughout the neighborhood. As noted in Section 4.1.1, the apartment buildings are not readily noticeable from among the other housing of the neighborhood.

Despite existence of affordable and low-income residences, the influx of market priced units and new residents have changed the overall demographic characteristics noted in the 2010 Census within the blocks containing Capitol Quarter. The demographic characteristics are likely now closer to those of the larger Capitol Hill community, which as described in Section 4.3.1, has a smaller percentage of minority residents and overall higher incomes in comparison to the District as a whole. In all likelihood, those census blocks identified in Figure 4-7 now occupied by Capitol Quarter do not meet the threshold of an EJ population.

Other census blocks shown as having high percentages of minorities include a strip of residences on the north side of the I-695, the block along 8th Street SE between Virginia Avenue SE and L Street SE, the block containing in Capper Senior Apartments. The population on the north side of Virginia Avenue SE is shielded from the LOD by I-695, and therefore, would not be affected by the construction of the Project. The 8th Street SE blocks are primarily taken up by commercial businesses (the east side of the block is currently a parking lot) and do not contain residences.

The only residential community adjacent to the LOD meeting the minority and low-income threshold is the Capper Senior Apartments, an assisted living facility. The facility's 162 apartments are in a single building located within the block directly south of Virginia Avenue SE between 5thStreet SE and the Marine Recreation Facility. According to management, approximately 90 percent of the residents are minority. In addition, residents must meet certain low-income requirements in order to rent an apartment at this facility.

4.4 Economic Conditions

Employment

The U.S. DOT Headquarters and the Navy Yard are the major employment centers in the general vicinity of the LOD. As noted in Section 4.1, the U.S. Department of the Navy employs, directly or indirectly, approximately 15,000 persons at the Navy Yard. The U.S. Department of

Transportation employs approximately 7,000 persons at its headquarters. In addition, the Government of the District of Columbia would have hundreds working at the newly renovated building located on Virginia Avenue SE between 2nd and 3rd Streets SE. The Capitol Riverfront also provides an increasing amount of employment near the LOD in the form of office and commercial buildings. With the Nationals Park and commercial development, the actual number of jobs in the general vicinity of the LOD would likely be higher than the forecasts made by the MWCOG. The number of office jobs would also likely increase due to the new construction office buildings in the area. Employment areas are also found in the commercial areas surrounding the LOD, including the Barracks Row and the Capitol Riverfront.

Commercial

The notable commercial areas near the LOD include Barracks Row, located north of I-695, and the Capitol Riverfront, located to the south of the LOD. Barracks Row is the 8th Street SE commercial district adjacent to the U.S. Marine Corps Barracks. Barracks Row underwent an $8.5 million streetscape improvement several years ago to make this district more pedestrian-friendly and now includes over 30 restaurants in addition to other commercial venues. Within the last few years, the Capitol Riverfront (also known as the Near Southeast) area has been transformed from a largely industrial and warehouse district into a mixed-use entertainment, residential, and commercial district. New government facilities such as the relocated U.S. DOT headquarters augment the number of government employees near in the LOD. Before these recent developments, the Washington Navy Yard in Near Southeast and Marine Barracks, north of I-695, were the main sources of government employment in the general vicinity of the LOD. Other commercial districts located further from the LOD include businesses along Pennsylvania Avenue SE and Eastern Market, which provides a venue for the sale of fresh farm product and handicrafts throughout the week, and is expanded during weekends.

Currently, the Capitol Riverfront contains almost seven million square feet of office space, and 172,000 square feet of retail space, in addition to 2,400 residential units. Furthermore, an additional 362,000 square feet of office space, 54,500 square feet of retail space, and 609 residential units are planned within Capitol Riverfront. The cornerstone of the Capitol Riverfront is the Nationals Park, a 41,000-seat Major League baseball stadium, which began construction in 2006 and completed in 2008. The home of the Washington Nationals, the stadium and environs sit on 21 acres just east of South Capitol Street between Potomac Avenue SE and N Street SE. The stadium is an economic generator for the Riverfront, attracting visitors from throughout the Washington Metropolitan Area, as well as tourists. Properties surrounding the ballpark are being developed into mixed-use commercial and residential uses, such as the strip of land along the Anacostia River south of the stadium that would be called Riverfront on the Anacostia, and two planned and one completed developments on the north of side of the ballpark.

4.5 Climate and Air Quality

Air quality and pollution are general terms that refer to one or more chemical substances that degrade the quality of the atmosphere. Individual air pollutants degrade the atmosphere by reducing visibility. They can also damage property, reduce the productivity or vigor of crops or natural vegetation, or reduce human or animal health.

In addition to summarizing the climate conditions for the area surrounding Virginia Avenue SE, this section introduces the applicable air quality regulations and standards and provides the baseline pollutant levels to evaluate the air quality impacts of the Project.

4.5.1 Applicable Regulations and Standards

The Clean Air Act (CAA), as amended by the Clean Air Act Amendments of 1990 (CAAA) and other rules and regulations such as the Control of Hazardous Air Pollutants from Mobile Sources rule promulgated by the US Environmental Protection Agency (EPA), implement environmental policies and regulations to promote and ensure acceptable levels of air quality, and were adopted in the Final Conformity Rule (40 CFR Parts 51 and 93).

The Clean Air Act defines conformity as:

> Conformity to an implementations plan's purpose of eliminating or reducing the severity and number of violations of the National Ambient Air Quality Standards (NAAQS) and achieving expeditious attainment of such standards; and that such activities will not:
> - Cause or contribute to any new violation of any NAAQS in any area;
> - Increase the frequency or severity of any existing violation of any NAAQS in any area; or
> - Delay timely attainment of any NAAQS or any required interim emission reductions or other milestones in any area."

The EPA established the NAAQS for the following six major air pollutants, which are known as criteria pollutant: carbon monoxide (CO), nitrogen dioxide (NO_2), ozone (O_3), particulate matter (PM_{10} and $PM_{2.5}$), sulfur dioxide (SO_2), and lead.

The federal standards are summarized in Table 4-10. The "primary" standards have been established to protect the public health. The "secondary" standards are intended to protect the nation's welfare and account for air pollutant effects on soil, water, visibility, materials, vegetation and other aspects of the general welfare.

4.5.2 Criteria Pollutants and Effects

Pollutants that have established national standards are referred to as "criteria pollutants". The sources of these pollutants, their effects on human health and the nation's welfare, and their final deposition in the atmosphere vary considerably. Brief descriptions of these pollutants are provided below.

Table 4-10
National Ambient Air Quality Standards

Pollutant		Standard Type	Averaging Time	Level	Form
Carbon Monoxide		primary	8-hour	9 ppm	Not to be exceeded more than once per year
			1-hour	35 ppm	
Lead		primary and secondary	Rolling 3 month average	0.15 $\mu g/m^3$ (1)	Not to be exceeded
Nitrogen Dioxide		primary	1-hour	100 ppb	98th percentile, averaged over 3 years
		primary and secondary	Annual	53 ppb (2)	Annual mean
Ozone		primary and secondary	8-hour	0.075 ppm (3)	Annual fourth-highest daily maximum 8-hr concentration, averaged over 3 years
Particle Pollution (Particulate Matter)	$PM_{2.5}$	primary	Annual	12 $\mu g/m^3$	annual mean, averaged over 3 years
		secondary	Annual	15 $\mu g/m^3$	annual mean, averaged over 3 years
		primary and secondary	24-hour	35 $\mu g/m^3$	98th percentile, averaged over 3 years
	PM_{10}	primary and secondary	24-hour	150 $\mu g/m^3$	Not to be exceeded more than once per year on average over 3 years
Sulfur Dioxide]		primary	1-hour	75 ppb (4)	99th percentile of 1-hour daily maximum concentrations, averaged over 3 years
		secondary	3-hour	0.5 ppm	Not to be exceeded more than once per year

Source: USEPA Office of Air and Radiation, *http://www.epa.gov/air/criteria.html* (updated December 14, 2012).

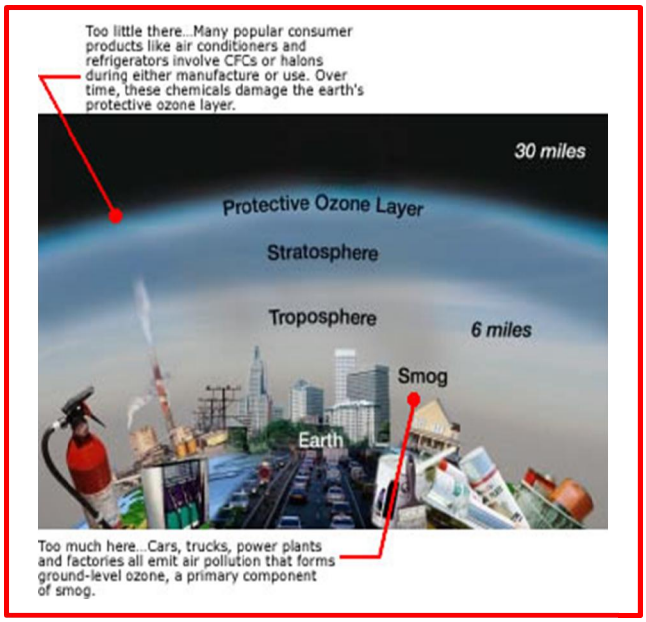
Notes: ppm = parts per million; ppb = parts per billion; std = standard; $\mu g/m^3$ = micrograms per cubic meter.
(1) Final rule signed October 15, 2008. The 1978 lead standard (1.5 $\mu g/m^3$ as a quarterly average) remains in effect until one year after an area is designated for the 2008 standard, except that in areas designated nonattainment for the 1978, the 1978 standard remains in effect until implementation plans to attain or maintain the 2008 standard are approved.
(2) The official level of the annual NO_2 standard is 0.053 ppm, equal to 53 ppb, which is shown here for the purpose of clearer comparison to the 1-hour standard.
(3) Final rule signed March 12, 2008. The 1997 ozone standard (0.08 ppm, annual fourth-highest daily maximum 8-hour concentration, averaged over three years) and related implementation rules remain in place. In 1997, USEPA revoked the 1-hour ozone standard (0.12 ppm, not to be exceeded more than once per year) in all areas, although some areas have continued obligations under that standard ("anti-backsliding"). The 1-hour ozone standard is attained when the expected number of days per calendar year with maximum hourly average concentrations

above 0.12 ppm is less than or equal to 1.
(4) Final rule signed June 2, 2010. The 1971 annual and 24-hour SO_2 standards were revoked in that same rulemaking. However, these standards remain in effect until one year after an area is designated for the 2010 standard, except in areas designated nonattainment for the 1971 standards, where the 1971 standards remain in effect until implementation plans to attain or maintain the 2010 standard are approved.

Ozone

Ozone (O_3) is a colorless, toxic gas. As shown in the illustration, O_3 is found in both the Earth's upper and lower atmospheric levels. In the upper atmosphere, O_3 is a naturally occurring gas that helps to prevent the sun's harmful ultraviolet rays from reaching the earth. In the lower layer of the atmosphere, O_3 is man-made. Although O_3 is not directly emitted, it forms in the lower atmosphere through a chemical reaction between volatile organic gases (VOCs) and nitrogen oxides(NOx), which are emitted from industrial sources and from automobiles. Substantial O_3 formations generally require a stable atmosphere with strong sunlight, thus high levels of O_3 are generally a concern in the summer. O_3 is the main ingredient of smog. O_3 enters the blood stream through the respiratory system and interferes with the transfer of oxygen, depriving sensitive tissues in the heart and brain of oxygen. O_3 also damages vegetation by inhibiting their growth. The affects of regional project related changes in ozone precursor (VOCs and NOx) emissions during construction were estimated for conformity purposes.

Ozone in the Atmosphere



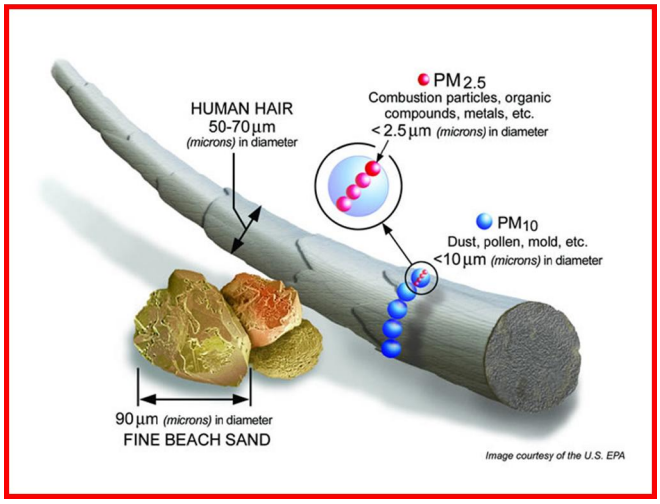
Source: U. S. Environmental Protection Agency

Particulate Matter

Particulate matter (PM) is composed of solid particles or liquid droplets that are small enough to remain suspended in the air. In general, particulate matter includes dust, soot, and smoke. These pollutants can be irritating but usually are not poisonous. It can also include bits of solid or liquid substances that can be toxic. Of particular concern are those particles that are smaller than, or equal to, 10 microns (PM_{10}) and 2.5 microns ($PM_{2.5}$) in size. PM_{10} is about one-seventh the thickness of a human hair (see illustration). Major sources of PM_{10} include motor vehicles; wood burning stoves and fireplaces; dust from construction, landfills, and agriculture; wildfires; windblown dust from open lands; and atmospheric chemical and photochemical reactions.

Suspended particulates produce haze and reduce visibility. For $PM_{2.5}$ (roughly 1/28th the diameter of a human hair), a substantial proportion of this pollutant in the atmosphere is attributable to the combustion of fossil fuels. $PM_{2.5}$ can be formed in the atmosphere from gases such as sulfur dioxide, nitrogen oxides, and volatile organic compounds. When inhaled, PM can penetrate the human respiratory system's natural defenses and damage the respiratory tract. $PM_{2.5}$ are so tiny that they can penetrate deeper into the lungs and damage lung tissues. The affects of project related changes in $PM_{2.5}$ emissions during construction were estimated for conformity purposes.

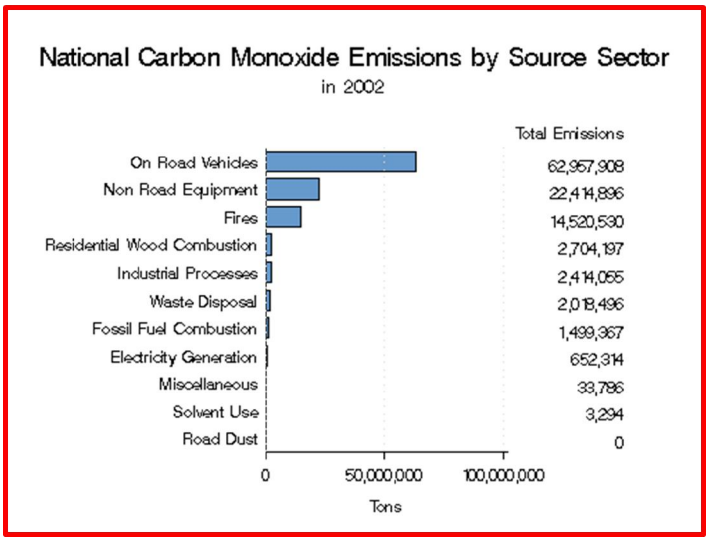
Relative Particulate Matter Size



Carbon Monoxide

Carbon Monoxide (CO), a colorless gas, is emitted almost exclusively from the incomplete combustion of fossil fuels. As shown in the illustration, on-road motor vehicle exhaust is the primary source of CO. Prolonged exposure to high levels of CO can cause headaches, drowsiness, loss of equilibrium, or heart disease. CO levels are generally highest in the colder months of the year when inversion conditions (warmer air traps colder air near the ground) are more frequent. CO concentrations can vary greatly over relatively short distances. Relatively high concentrations of CO are typically found near congested intersections, along heavily used roadways carrying slow-moving traffic, and in areas where atmospheric dispersion is inhibited by urban "street canyon" conditions. Therefore, CO concentration levels near congested roadways and/or intersections affected by a proposed project are usually predicted on a localized or microscale level. The effects of project related changes in CO emissions during construction were estimated for conformity purposes.

Sources of Carbon Monoxide



Source: U. S. Environmental Protection Agency

Nitrogen Dioxide

Nitrogen Dioxide (NO_2), a brownish gas, irritates the lungs and can cause breathing difficulties at high concentrations. Like O_3, NO_2 is not directly emitted, but is formed through a reaction between nitric oxide (NO) and atmospheric oxygen. NO and NO_2 are collectively referred to as nitrogen oxides and are major contributors to ozone formation. NO_2 also contributes to the formation of PM_{10}. In high concentrations, NO_2 results in a brownish-red cast to the atmosphere and reduced visibility. NO_2 was included in the construction phase analysis for NEPA purposes (i.e., to address community concerns).

Lead

Lead is a stable element that persists and accumulates both in the environment and in animals. Its principal effects in humans are on the blood-forming, nervous, and renal systems. Lead levels in the urban environment from mobile sources have substantially decreased due to the federal prohibition of leaded gasoline. Therefore, the Project analysis did not include lead.

Sulfur Dioxide

Sulfur Dioxide (SO_2) is a product of high-sulfur fuel combustion. The main sources of SO_2 are the burning of coal and oil for power plants and industry and domestic heating. Another source of SO_2 is industrial chemical manufacturing. SO_2 is an irritant gas that affects the throat and lungs. It can cause acute respiratory symptoms, especially in children. SO_2 can also yellow plant leaves and erode iron and steel. It is a precursor to $PM_{2.5}$, and therefore, the effects of project related changes in SO_2 emissions during construction were estimated for conformity purposes.

4.5.3 Other Pollutants and Effects

Mobile Source Air Toxics

In addition to the criteria pollutants, the EPA also regulates air toxics. Most air toxics originate from human made sources, including on-road mobile sources, non-road mobile sources (e.g., airplanes), area sources (e.g., dry cleaners), and stationary sources (e.g., factories or refineries).

Mobile Source Air Toxics (MSATs) are a subset of the 188 air toxics defined by the CAA. The MSATs are compounds emitted from highway vehicles and non-road equipment. Some toxic compounds are present in fuel and are emitted into the air when the fuel evaporates or passes through the engine unburned. Other toxics are emitted from the incomplete combustion of fuels or as secondary combustion products. Metal air toxics also result from engine wear or from impurities in oil or gasoline.

The EPA identified the following seven compounds from mobile sources that are among the national and regional-scale cancer risk drivers: benzene, acrolein, formaldehyde, 1,3-butadiene, diesel exhaust; naphthalene; and polycyclic organic matter. Descriptions of these compounds are provided in air quality technical report in Appendix D.

While FHWA considers these the priority MSATs, the list is subject to change and may be adjusted in consideration of future EPA rules. MSATs were included in the construction phase analysis for NEPA purposes.

Greenhouse Gases

In 2007, the Supreme Court decided in Commonwealth of Massachusetts v. Environmental Protection Agency that carbon dioxide is a pollutant, subject to regulation under the Clean Air Act. Since then, the federal government has taken a number of steps to regulate carbon dioxide emissions as part of an overall program addressing greenhouse gases (GHG). Thus, for example, EPA has adopted a GHG Monitoring, Recordkeeping and Reporting Rule requiring certain suppliers of fossil fuels or industrial GHGs to report to EPA on emissions from particular facilities. That rule does not apply to the activities contemplated by the Virginia Avenue Tunnel Project.

Also, a number of federal agencies have concluded that it is not possible to link a project's emissions to particular climatic effects in a NEPA review. In particular, the 2010 Draft Guidance on Consideration of the Effects of Climate Change and Greenhouse Gas Emissions, authored by CEQ, states that "it is not currently useful for the NEPA analysis to attempt to link specific climatological changes, or the environmental impacts thereof, to the particular project or emissions, as such direct lineage is difficult to isolate and to understand."

4.5.4 Attainment Status and Conformity with Regional Air Quality Planning

Section 107 of the 1977 Clean Air Act Amendment requires that the EPA publish a list of all geographic areas in compliance with the NAAQS, as well as those areas that are not in attainment with the NAAQS. The designation of an area is made on a pollutant-by-pollutant basis. The EPA's area designations are shown in Table 4-11.

Table 4-11
Attainment Classifications and Definitions

Classification	Definition
Attainment	Area is in compliance with the NAAQS
Unclassified	Area has insufficient data to make determination and is treated as being in attainment.
Maintenance	Area once classified as nonattainment but has since demonstrated attainment of the NAAQS.
Nonattainment	Area is not in compliance with the NAAQS

The LOD is part of the National Capital Interstate Air Quality Control Region, and is classified as a maintenance area for CO, a nonattainment area for $PM_{2.5}$ (1997 standard), a marginal

nonattainment area for O_3 (2008 standard), and an attainment area for all of the other criteria pollutants.

The District of Columbia is part of the MWCOG, a regional organization of the Washington Metropolitan Area composed of 20 state and local governments surrounding the nation's Capital, in addition to members the U.S. Senate and the U.S. House of Representatives.

As described in Section 4.1.2.3, the MWCOG is responsible for preparing the CLRP and the TIP. The CLRP and the TIP serve as the basis for the regional mobile source air quality analysis, which utilizes vehicle miles traveled (VMT) and emissions factors to determine emissions estimates for the entire transportation system. The analysis results, presented under the Transportation Conformity Rule, demonstrate that the CLRP and the TIP are consistent with the goals of the *State Implementation Plan* (SIP). The SIP includes a list of measures to reduce pollution in order for the area to become attainment by a designated date. An Air Quality Conformity Report is prepared that contains emissions ceilings to which the TIP must conform. The analysis in the Air Quality Conformity Report demonstrates that mobile source emissions, estimated for the TIP and for each analysis year of the long range plan, adhere to all emissions ceilings, which are either approved or under review by the EPA.

The TPB approved the 2012 CLRP and FY 2013-2018 TIP on July 18, 2012. The Project is listed as ID # 5959 in the 2013-2018 TIP. As part of an approved TIP, the Project is part of the region's plan to meet the required air quality goals as mandated in the Clean Air Act. The Project is also included in the 2010 CLRP on page 34, "Accommodating Regional Freight Growth." The Project is part of the *National Capital Region Freight Plan 2010*, which was approved by the TPB on July 21, 2010.

4.5.5 Ambient Air Quality

4.5.5.1 Climate and Local Meteorology

Climatic conditions are an important element in assessing the ambient air quality of an area, with and without the proposed action. Summers in the District of Columbia area are warm and humid and winters are cold, but generally not severe. The summertime temperature is typically in the upper 80s and the winter is typically in the upper 20s. Thunderstorms can occur at any time but are most frequent during the late spring and summer. Annual precipitation has ranged from about 25 inches to more than 55 inches. Rainfalls of over 10 inches in a 24-hour period have been recorded during the passage of tropical storms. The seasonal snowfall is nearly 24 inches, but varies greatly from season to season. Snowfalls of 4 inches or more occur only twice each winter on average. Accumulations of over 20 inches from a single storm are extremely rare. Storm damage results mainly from heavy snows and freezing rains in winter and from hurricanes and severe thunderstorms during the other seasons.

Prevailing winds are from the south except during the winter months when they are from the northwest. The windiest periods are late winter and early spring. Winds are generally less during the night and early morning hours and increase to a high in the afternoon. Winds may

reach 50 to 60 miles per hour or even higher during severe summer thunderstorms, hurricanes, and winter storms.

4.5.5.2 Monitored Air Quality

MWCOG collects data from five air quality monitors stationed at various locations throughout the District. The maximum pollutant concentrations collected at these locations for the years 2009-2011 and a comparison of these values with the applicable air quality standards are presented in Table 4-12. As shown on this table, the 8-hour ozone standard was the only violated NAAQS (see Table 4-10) from 2009 through 2011. The recorded values for the other pollutants are less than (within) the NAAQS.

4.6 Noise

This section reports the findings of noise measurements taken along the LOD. For more information, the complete noise technical report is located in Appendix E.

4.6.1 Description and Characteristics of Noise

Noise level is measured in decibels (dB). Because the human ear does not perceive all pitches or frequencies equally, noise levels are adjusted, or weighted, to correspond to human hearing. This adjusted unit is known as the A-weighted decibel, or dBA, which is measured in a logarithmic scale. This means that a 10 dBA difference is a doubling in noise level. Generally, the average healthy human ear barely perceives noise level changes of 3 dBA. Based on the results of many acoustical studies, it has been further accepted that a 5 dBA change is readily perceptible.

Many sources of high noise, such as a busy highway, tend to fluctuate from moment to moment. Consequently, to measure fluctuating noise accurately, the noise levels are averaged at a set period of time to arrive at single number called the equivalent continuous noise level or Leq. Another noise measure, called the day-night sound level or Ldn, is defined as the cumulative 24-hour noise exposure that accounts for the moment to moment fluctuations in dBA from all sound sources during the 24-hour period.

Rail transit-related noise, such as noise from a moving freight train, is generated by the whine from traction motors, air-turbulence from cooling fans; changes in gearing; and the interaction of wheels with their running surfaces (e.g., tracks). This latter source generates three types of noise:

- Rolling noise due to continuous rolling contact;
- Impact noise when a wheel encounters a discontinuity in the running surface, such as a rail joint, turnout or crossover; and
- Squeal generated by friction on tight curves.

Table 4-12
Ambient Air Quality Monitor Data 2009-2011

		Verizon Phone Co. 2055 L St., NW			420 34th St. NE			Takoma Sc., Piney Branch Road & Dahlia Street			2500 1st Street, N.W.			Park Services Office, 1100 Ohio Drive		
		2009	2010	2011	2009	2010	2011	2009	2010	2011	2009	2010	2011	2009	2010	2011
Ozone (O3) [ppm]																
1-Hour	Maximum	2.5	2.8	5.0	4.2	3.7	2.7						3.1			
	2nd Maximum	2.5	2.7	4.2	4.2											
	# of Exceedances	0	0	0	0	0	0						0			
8-Hour	Maximum	2.0	2.4	2.2	4.0	3.5	2.5						2.5			
	2nd Maximum	1.9	2.0	1.9	3.38	3.1	2.3						2.4			
	# of Exceedances	0	0	0	0	0	0						0			
Particulate Matter [ug/m3]																
PM10	Maximum 24-Hour				47.0	85.0					41.0	51.0	40.0			
	# of Exceedances				0	0					0	0	0			
PM2.5	98th Percentile				26.0	28.0	25.0				24.0	26.0	25.0	23.0	23.0	26.0
	Mean Annual				10.5	11.4	10.4				10.2	10.5	10.3	10.1	11.0	10.2
	# of Exceedances				0	0	0				0	0	0	0	0	0
Ozone (O3) [ppm]																
8-Hour	Fourth Highest				0.064	0.086	0.080	0.072	0.079		0.071	0.082	0.085			
	# of Exceedances				2	15	6	1	6		2	16	11			

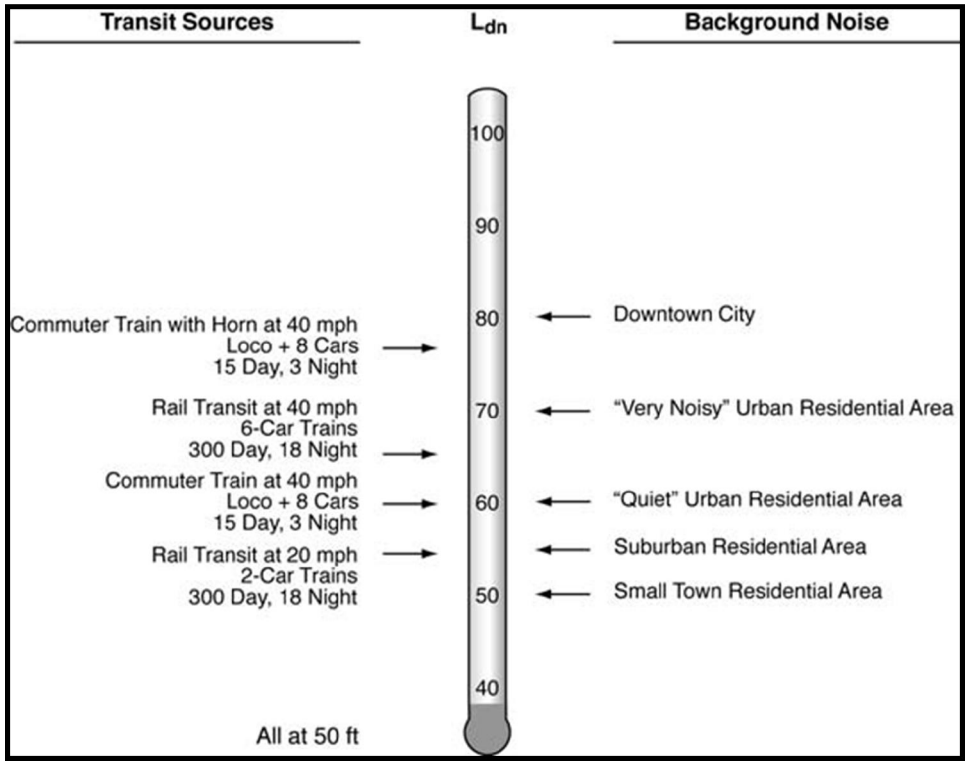
Table 4-12 (Continued)
Ambient Air Quality Monitor Data 2009-2011

		Verizon Phone Co. 2055 L St., NW			420 34th St. NE			Takoma Sc., Piney Branch Road & Dahlia Street			2500 1st Street, N.W.			Park Services Office, 1100 Ohio Drive		
		2009	2010	2011	2009	2010	2011	2009	2010	2011	2009	2010	2011	2009	2010	2011
Nitrogen Dioxide (NO_2) [ppm]																
1-Hour	98th Percentile				0.063	0.055	0.059	0.053		0.055	0.062	0.052	0.057			
	# of Exceedances				0	0	0	0		0	0	0	0			
Sulfur Dioxide (SO_2) [ppm]																
1-Hour	99th Percentile				0.039	0.021	0.020						0.005			
	# of Exceedances				0	0	0						0			

Note: Grey shaded blocks represent areas of no measurement.
Source: EPA Office of Air Quality Planning and Standards (AIRSData); http://www.epa.gov/air/data/geosel.html

The illustration on the following page provides examples of typical transit noise and background levels in terms of Ldn. Ldn generally ranges between 55 dBA and 75 dBA in most urban communities.

Typical Transit and Background Noise Levels (Ldn)



Federal Railroad Administration (FRA) guidelines were used to identify noise sensitive land uses and to characterize the ambient noise conditions at these receptors. A description of these procedures is provided in the noise technical report prepared for this Project.

The FRA guidelines use three categories of noise sensitive land uses:

- Category 1: Places where quiet is an essential element of their intended purpose;
- Category 2: Residences and buildings where people normally sleep; and
- Category 3: Institutional land uses with primarily daytime and evening use.

Categories 1 and 3 use the Leq noise descriptor, whereas Category 2 uses the Ldn descriptor.

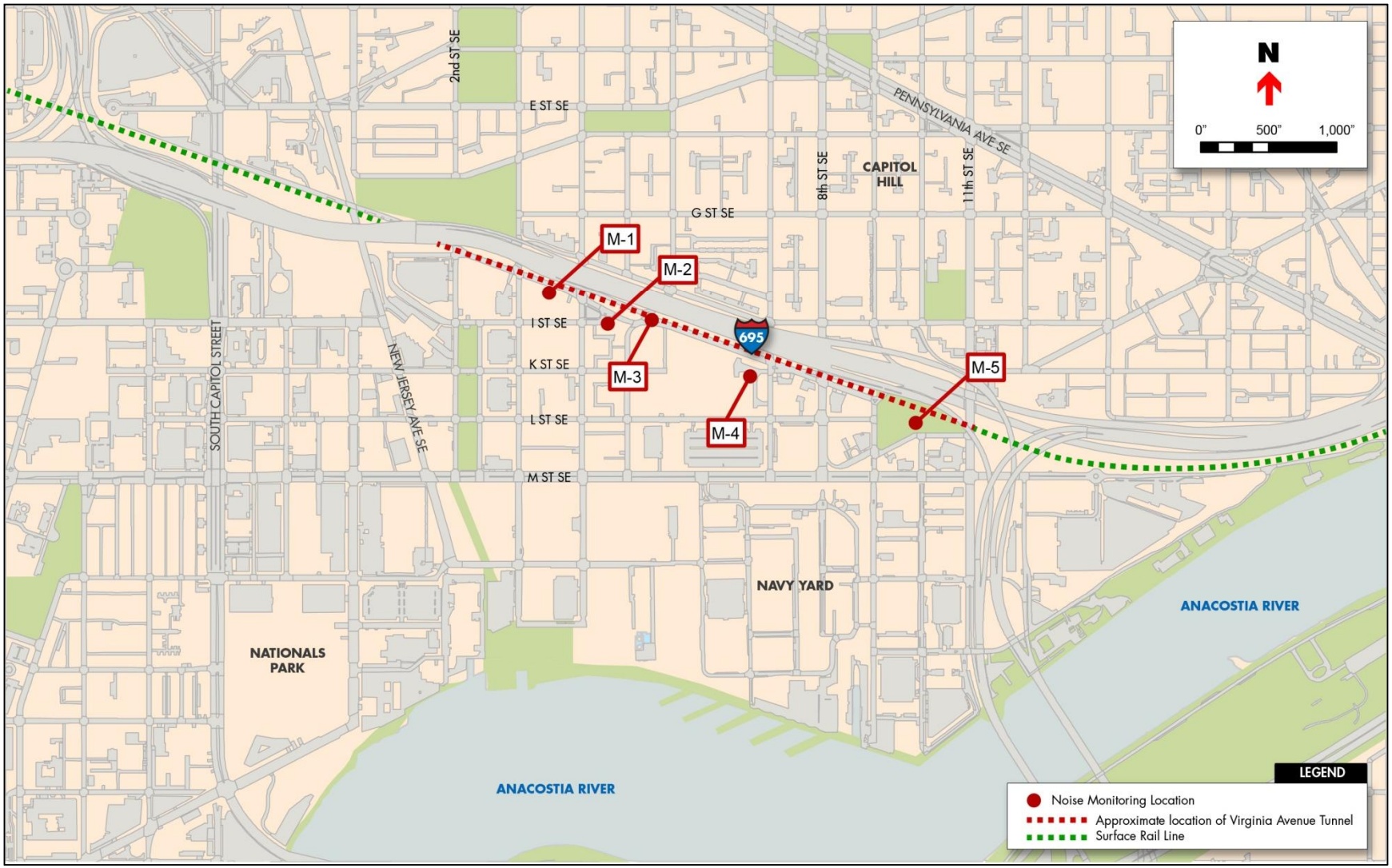
4.6.2 Existing Noise Conditions

Five noise sensitive receptors were identified within the FRA recommended screening distance of 750 feet from the centerline of the proposed facility. All five receptors near the LOD are residences or places where people sleep (Category 2). They include:

- Capitol Quarter residences: 2 sites located within the 300 and 400 blocks of Virginia Avenue SE and identified as M-1 and M-2, respectively;
- Capper Senior Apartments: identified as M-3;
- Bachelors quarters at the Marine Corps Recreation Facility: identified as M-4; and
- Residences along the 900 block of Potomac Avenue SE: identified as M-5.

At each site, existing noise levels were measured in accordance with FRA procedures. The specific locations monitored are considered representative of surrounding properties that share

Figure 4-8
Noise Monitoring Locations



the same land use. The noise measurements taken yield typical ambient noise conditions common among areas surrounding the representative receptors. The noise measurements, which included 24-hour monitoring, were collected and repeated three times at all five sites between May 22, 2012 and June 21, 2012. Table 4-13 shows the results of the measurements conducted at these sites. The locations of the measurement sites are shown on Figure 4-8.

As shown in Table 4-13, noise levels range from 68 dBA at M-5 (residences along Potomac Avenue SE) to 73 dBA at M-3 (Capper Senior Apartments). In general, the high noise levels (55 dBA is considered the low end for urban communities) reflect the proximity of the receptors to I-695, which generates high noise levels due to high traffic volumes and speed. Those receptors located closest to I-695, such as the Capper Senior Apartments and Capitol Quarter, have the higher ambient noise levels among the five receptors.

Table 4-13
Existing Measured Sound Levels at Sensitive Receptors

Site ID	Description	Land Use	Noise Levels (dBA)
M-1	Capitol Quarter,300 Block	Residential	70 Ldn
M-2	Capitol Quarter,400 Block	Residential	70 Ldn
M-3	Capper Senior Apartments	Residential	73 Ldn
M-4	Marine Bachelors Quarters	Residential	69 Ldn
M-5	Potomac Avenue SE Residences at 900 Block	Residential	68 Ldn

4.7 Vibration

This section reports the findings of vibration measurements taken along the LOD. For more information, the complete vibration technical report is in Appendix F. Federal Transit Administration (FTA) vibration guidance is used for freight rail projects if a vibration analysis is required.

4.7.1 Description and Characteristics of Vibration

Vibration is oscillatory motion, and is described in terms of displacement, velocity or acceleration. Displacement is simply the distance that a point on the floor or ground moves away from its static position. Velocity is the speed of the floor movement. Acceleration is the rate in which the speed changes. Velocity or acceleration is the typical means to identify vibration responses of humans, buildings, and equipment. Velocity is used in this section to describe ground-borne vibration.

For evaluating the effect of vibration on buildings, peak particle velocity (PPV) is used as the measure to evaluate vibration levels. For human responses, the root mean square (RMS)

velocity is used as the measure. The FTA uses the abbreviation, "VdB" for vibration decibels so as to not confuse it with sound decibel ("dB").

The illustration on the following page provides common vibration sources and the human and structural responses to ground-borne vibration from these sources. The threshold of perception for human response is approximately 65 VdB, but is not usually notable unless the vibration exceeds 70 VdB unless the person is in a highly sensitive location (e.g. concert hall).

4.7.2 Existing Vibration Conditions

Vibration measurements were conducted to determine the vibration levels in structures located adjacent to Virginia Avenue SE or near the LOD from the operation of trains through the tunnel. These measurements were also used to calculate vibration transferability characteristics of the soils along the street, which was then used to predict the vibration levels from construction activities and future train operations within the rebuilt tunnel. To establish the baseline vibration characteristics (i.e., highest vibration levels possible), measurements were taken next to the rails east of the east portal. Figure 4-9 identifies these as Sites 6 and 7. To characterize existing vibration levels at the most sensitive buildings near Virginia Avenue SE, measurements were taken along the Capitol Quarter residences fronting the street (Sites 1 and 2) and at the Marine Recreation Facility (Sites 3, 4 and 5). The Marine Recreation Facility contains two vibration-sensitive uses: U.S. Marine Band practice hall and bachelor enlisted quarters. Indoor measurements were taken within the practice hall. The others were outdoor measurements. Although the St. Paul AUMP Church site was not subject to vibration

Typical Levels of Ground-Borne Vibration

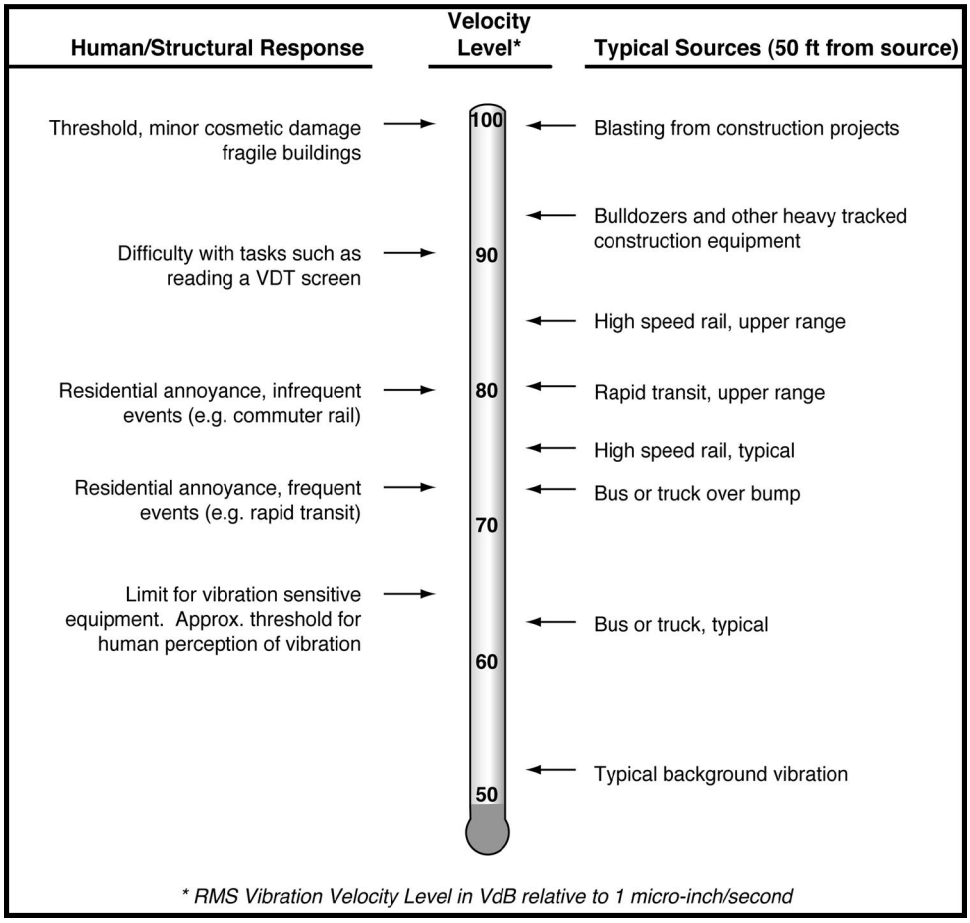
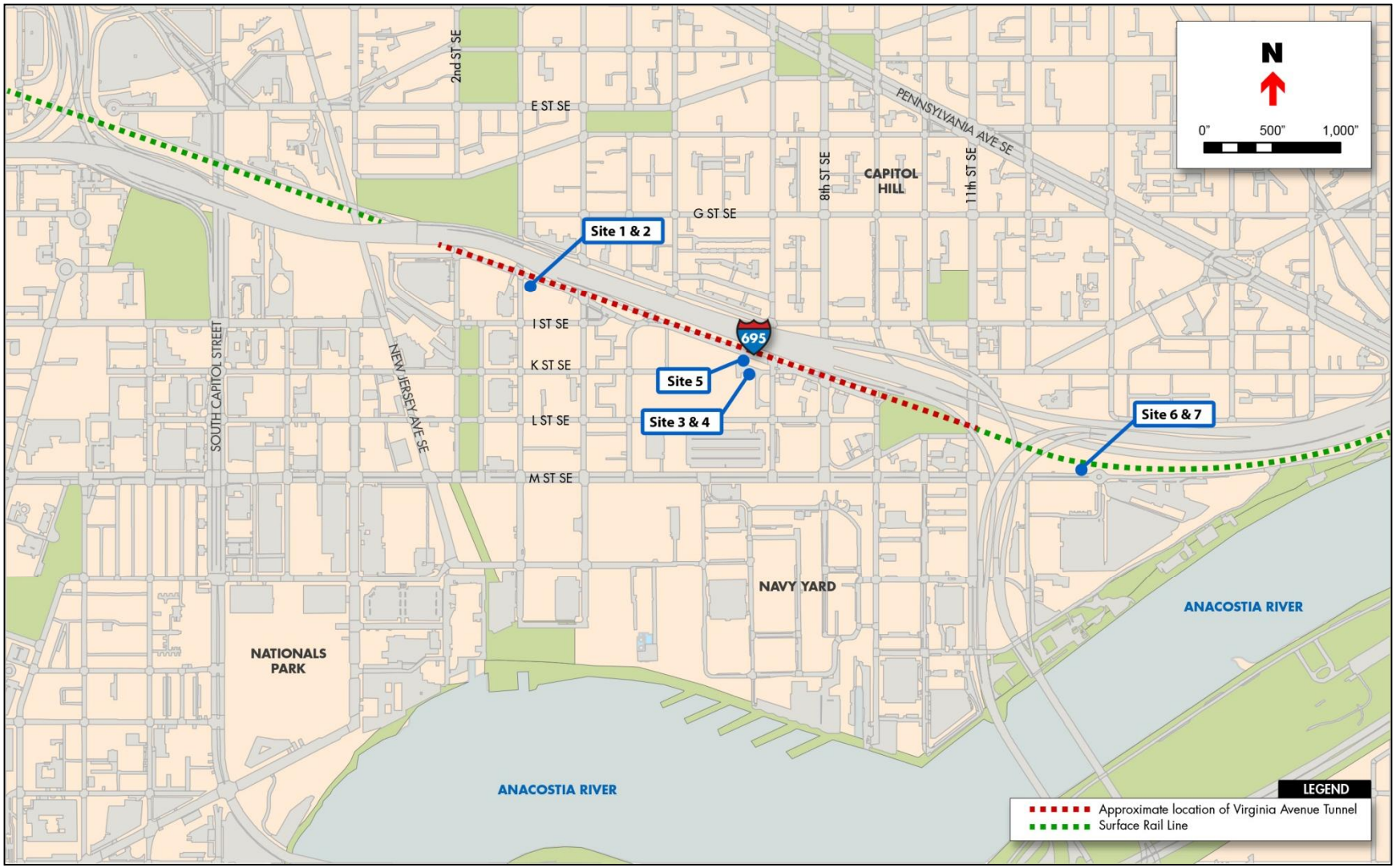


Figure 4-9
Vibration Monitoring Locations



monitoring because it is located about 100 feet from the tunnel alignment, the building is an historic property listed on the National Register of Historic Places (see Section 4.11), and is susceptible to vibration-related damage.

Vibration levels at each location were measured for at least five train pass-bys on May 22, 2012. During each measurement, speed of the train was recorded near the east portal using a radar gun and numbers of the locomotives as well as number of the cars were recorded for each train. The measurement probe was left overnight at the Marine Band Practice Hall location, which captured additional train pass-bys. Background vibration levels without any trains pass-bys were also recorded at each measurement site.

With the exception of the measurement sites next to the rails (6 and 7), existing train pass-bys did not cause vibration at the Marine band practice hall and bachelor's quarters and Capitol Quarter to rise above normal background levels.

4.8 Site Contamination - Soil

4.8.1 Geology

The LOD is located entirely within the Coastal Plain Physiographic Province. It is part of the Quaternary (Pleistocene) Age Wicomico Formation. This formation consists of gravel, sand, and silt, and has local basal deposits of carbonaceous clay containing tree stumps and other woody debris. Medium to coarse grained sand and gravel with cobbles and boulders near the base commonly contain reworked Eocene glauconite. Varicolored silts and clays and brown to dark gray lignitic clay contain estuarine to marine fauna in some areas. The thickness of these deposits ranges from zero to 150 feet.

A 1998 material evaluation investigation of the Virginia Avenue Tunnel included the drilling of ten soil borings adjacent to the tunnel using hollow stem augers and split-spoons advanced every five feet (providing intermittent lithologic information). The boring logs showed that fill soil was present in most of the borings at varying thicknesses up to about 26 feet. The fill appeared to consist of a sandy silty clay mixture with rocks and cobbles. Generally, red and gray clay or silty clay layers were below the fill material to the maximum depth of the borings (35 or 40 feet below the ground surface).

According to the *Soil Survey of District of Columbia* (Natural Resources Conservation Service [NRCS], 1976), the soil types within and in the general vicinity of the LOD are classified as urban land or an urban land complex (see Figure 4-10). This indicates disturbances in the past, and is consistent with current and past land uses and human activities. The soils occur on slopes of 0 to 8 percent, and range from well-drained to poorly-drained. None of the soil types are hydric (i.e., suitable for wetland formation).

Urban land (Ub) and Udorthents (U1) comprise most of the LOD. The soil survey describes Urban land as consisting of nearly level or moderately sloping areas that are more than 80

Figure 4-10
Soils in the General Vicinity of the Project

percent covered by asphalt, concrete, buildings or other impervious surfaces. Udorthents, which consist of areas of cut, filled or otherwise disturbed soils, are scattered throughout.

The fill material comprises a mixture of organic and inorganic materials from human activity and sandy, gravelly, clayey, silty, or micaceous soil material. Earthy fill comprises most of the fill material in these areas, although in some areas the fill is composed of non-soil materials such as bricks, trash, wire, metal, boards, cinders and concrete. The variability of the composition of the fill leads to highly variable soil characteristics. Areas containing only small amounts of coarse fragments are generally high in fertility and available water capacity and have good potential for lawns and landscaping.

4.8.2 Site Contamination

The Project is located in an area that has had over 100 years of commercial and industrial use. Because the Project would involve excavation of soil in the vicinity of the existing tunnel, studies were conducted to determine whether there is potential soil and groundwater contamination that could affect how excavated material is handled and disposed of.

Several sources were used to evaluate the potential for soil or groundwater contamination within the LOD as a result of current and/or historical activities on nearby and adjacent properties. They include:

- Database search of governmental records that list facilities that are known to be contaminated or may potentially be contaminated
- Review of past topographic maps, aerial photographs, Sanborn fire insurance maps, and street directory information;
- Supplemental library research;
- A 1998 investigation of soil and groundwater conditions surrounding Virginia Avenue Tunnel; and
- Soil and groundwater investigations conducted for this Project (in 2012).

The results of this assessment are detailed in the Modified Phase I Environmental Site Assessment (Phase I ESA), which is provided in Appendix G. A summary of this evaluation is provided below.

4.8.2.1 Database and Historic Mapping Review

<u>Historical Topographic Maps</u>

The historic topographic maps were reviewed for information regarding the location or changes in location of city streets, expressways, railroad lines, and large or landmark buildings near the LOD. Early maps showed a rail line on K Street south of Virginia Avenue SE, extending to Virginia Avenue SE, where it likely entered the original part of the tunnel east of 7th Street SE. Potomac Avenue SE also was depicted as extending through Virginia Avenue. Later maps showed the presence of I-695, and that Potomac Avenue SE was no longer present between 10th and 12th Streets SE.

Historical Aerial Photographs

The aerial photographs easily identified one of the facilities of concern, a bulk petroleum facility, with above-ground storage tanks associated with this facility visible in aerials taken from 1949 to the 1990s. Other features revealed in the aerial photographs included the former position and extent of various streets and blocks of buildings that were demolished when I-695 was originally constructed.

Historical Sanborn Maps

The Sanborn Maps identified 16 facilities of concern. They include former gas stations, facilities with underground storage tanks, cleaners, auto repair facilities, coal yards, and a bulk petroleum facility.

Historical Street Directories

Review of historic street directories identified 48 facilities of concern. They include dry cleaners and laundries, auto repair facilities, printers, metal works, gas stations, and coal yards.

Governmental Database Search

Using a vendor specializing in querying databases maintained by various state and federal agencies, information about contaminated and potentially contaminated properties in the general vicinity of the LOD was obtained. The database search identified a potential 208 facilities within the search distances specified by the query. Of these, 31 were believed to be close enough to be facilities of concern.

Site Listing Summary

Over 60 facilities of concern were identified adjacent to or near the LOD from the sources described above. Some were identified in multiple sources. The Modified Phase I ESA in Appendix G contains the full list. The identified facilities of concern mostly include former and current gasoline stations, dry cleaners, auto repair shops, industrial buildings, and other commercial properties. Subsurface impacts to soils and groundwater may have resulted from the current and historical usage, material storage practices, spills, fill material, or leakage from storage tanks at these facilities. Current and/or former gasoline stations and automotive repair facilities are examples of facilities that may have subsurface contamination as a result of Leaking Underground Storage Tanks (LUSTs) or general petroleum substance use. Current and/or former dry cleaning operations represent a risk of subsurface contamination as the result of the use of chemicals in the dry cleaning process.

4.8.2.2 Soil and Groundwater Investigations

In addition to the identification of facilities of concern, information regarding the presence of actual soil or groundwater contamination was obtained through the collection of soil and groundwater samples during the 1998 and 2012 investigations.

1998 Material Evaluation Study

A material evaluation study of the Virginia Avenue Tunnel and its surrounding soil and groundwater was conducted in 1998 by Ogden Environmental and Energy Services, Inc. for CSX. The study included a sampling program of areas within and immediately adjacent to the tunnel, and included collecting samples from 10 soil borings drilled above and adjacent to the tunnel, 10 soil samples collected from the sub grade inside the tunnel, seven water samples from inside the tunnel (seepage of water in the tunnel), five electrical duct liquid/sediment samples inside the tunnel, five electrical duct seal samples from inside the tunnel, and one soot sample collected inside the tunnel.

Soil samples were analyzed for polychlorinated biphenyls (PCBs), total petroleum hydrocarbons in the gasoline (TPH-GRO) and diesel range organics (TPH–DRO), benzene, toluene, ethylbenzene, and xylenes (collectively BTEX compounds), toxicity characteristic leaching procedure (TCLP) for volatile and semi-volatile organic compounds (VOCs and SVOCs) and the eight Resource Conservation and Recovery Act (RCRA-8) metals (arsenic, barium, cadmium, chromium, lead, mercury, selenium, and silver), asbestos, and oil and grease.

Laboratory analytical results showed that TPH-DRO was present in seven of the 10 soil samples collected within the tunnel at concentrations exceeding method detection limits. The concentrations in six of the seven samples exceeded the soil action limits established by the DC Municipal Regulations.

Inside the tunnel, the samples collected from the electrical duct did not contain PCBs or asbestos. PCBs were commonly used in electrical equipment manufactured prior to 1979. In addition, the tunnel soot sample did not contain TCLP VOCs, SVOCs, or metals.

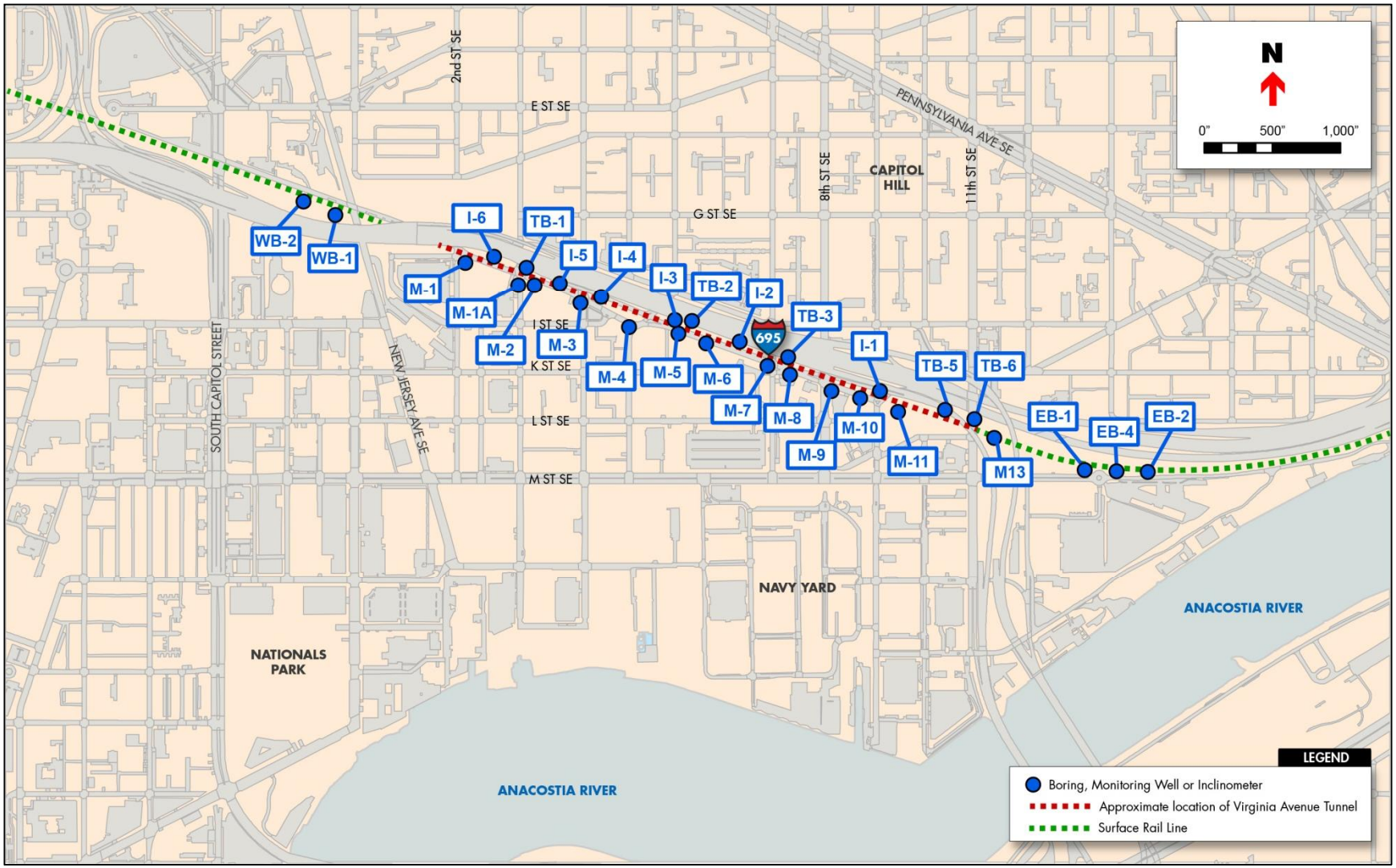
Of the seven water quality samples collected from inside the tunnel, three of the water samples contained TPH-GRO and –DRO and oil and grease at concentrations requiring proper management. Other surface water samples contained analyzed parameters at concentrations exceeding method detection limits, but below action levels. The report concluded that soils outside the tunnel at the seep locations may contain the same constituents detected in the seep samples.

2012 Investigation

In May and June 2012, two phases of soil sampling and one round of water sampling were conducted to help characterize the soils that may be excavated and the groundwater that may be removed during construction activities. The locations of these borings and their numbers are shown in Figure 4-11. This data collection was also used to characterize the soils and groundwater conditions to assist in the engineering of the Project.

Phase I soil sampling was conducted in May 2012, and included a total of 19 sample locations along Virginia Avenue. Three soil samples were collected from each of the soil borings, for a total of 57 soil samples collected from these 19 locations. Phase 2 soil sampling was conducted

Figure 4-11
Soil and Groundwater Sampling Locations



in June 2012, and consisted of sampling from 10 boring locations inside and just outside of the existing Virginia Avenue Tunnel. Nine soil samples were collected from five boring locations inside the tunnel, and another eight samples were collected from five locations at the tunnel portals.

These samples were analyzed for VOCs, TPH-GRO and -DRO, SVOCs, RCRA-8 metals and PCBs. For safety reasons, sampling was not conducted within 0 to 5 feet below ground surface (BGS). Soil samples were collected every five feet beginning 5 feet BGS to a depth of 47 feet BGS and 20 BGS for Phases 1 and 2, respectively. In addition to the soil borings, 16 monitoring wells were installed within the LOD, but only five of these wells contained water (see Figure 4-11). The wells were installed at depths of 58 to 67 feet BGS.

Laboratory results show that nearly all of the soil samples contained arsenic and chromium at concentrations exceeding the residential action levels established by the EPA, but below industrial action levels. In addition, samples from borings I-1, I-4, I-5, I-6, M-2, M-5, and M-13 each contained at least one SVOC at concentrations exceeding the residential action levels, but below industrial action levels, established by the EPA and the DC Department of the Environment (DDOE).

The arsenic concentrations are likely reflective of natural, background concentrations, and not an indicator of a contaminant source. The originally reported chromium concentrations were unspeciated chromium, and were compared against the action levels for both the chromium III and chromium VI species. Further evaluation of the chromium data was conducted by analyzing the samples for chromium species (Cr^{3+} and Cr^{6+}). Several of the samples were found to contain concentrations of Cr^{6+} at concentrations exceeding the residential action levels. In most cases, the Cr^{6+} exceedances were found in samples collected from the deeper intervals within the borings, not the shallow interval. This may be indicative of natural background conditions, rather than contamination.

The SVOCs may possibly be indicative of "heavy" petroleum contamination (e.g., diesel fuel). The lateral extent of this contamination has not been fully defined, and does not appear to be the result of migration from a single specific source. Samples from the shallow interval of borings along the entire length of the tunnel contain at least one of these compounds at concentrations exceeding action levels.

The laboratory results of the groundwater show that numerous VOCs, SVOCs, and metals are present at concentrations exceeding the method detection limits in monitoring wells M-4, M-8, M-10, and WB-1. Of the parameters detected in these wells, only naphthalene in M-8 was present at a concentration exceeding residential action levels.

The potential for PCB release from the electrical duct was re-evaluated during the 2012 investigations. Samples of materials surrounding the concrete conduits containing the electrical duct were collected during the 2012 investigations to check for the presence of PCBs.

The samples were submitted for laboratory analysis, and none of them were found to contain PCBs.

The 2012 investigations confirmed that approximately 8,000 square feet of black felt paper inside the concrete vaults, which extend the entire length of the of the tunnel, contain asbestos.

4.9 Water Resources

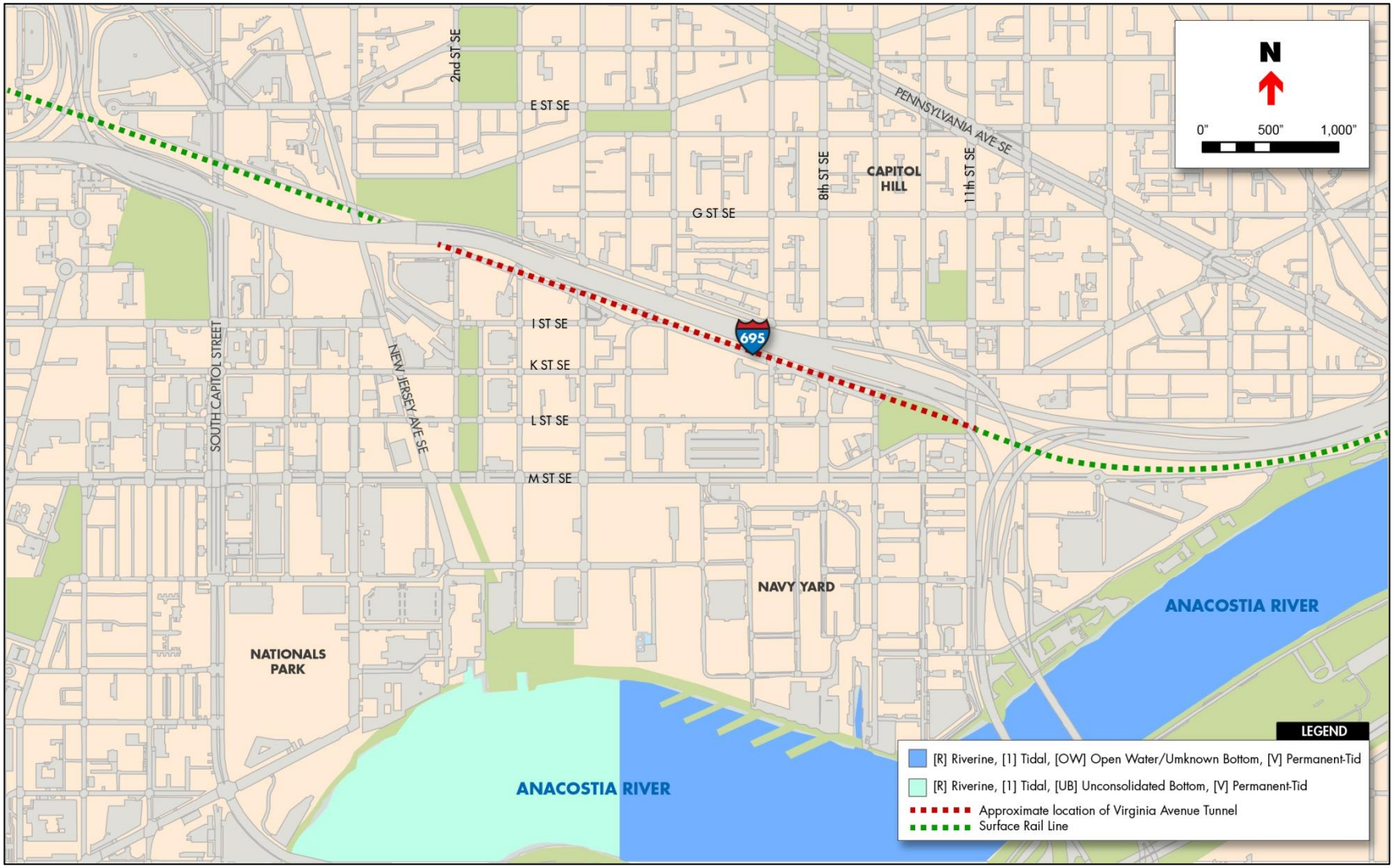
Section 404 of the Federal Water Pollution Control Act of 1972, also referred to as the Clean Water Act, provides protection for Waters of the United States. Waters of the United States could be generally defined as all navigable waters and waters that have been or could be used for interstate or foreign commerce, their tributaries, and any waters that, if affected, could affect the former, including wetlands. Water resources are regulated by several federal and local laws and regulations including the Clean Water Act; Code of Federal Regulations (CFR) Part 122.26 – Storm Water Discharges; Safe Drinking Water Act of 1974; the District's Water Pollution Control Act of 1984; the District's Storm Water Permit Compliance Amendment Act of 2000; and Title 21 of the District's Municipal Regulations (Chapter 11- Water Quality Standards and Chapter 19 – Water Quality Monitoring Regulations).

A review of existing GIS data showed no Waters of the US or wetlands within the LOD. A field visit confirmed that no water features occur within the LOD other than two small unregulated wet areas, which are discussed below in Section 4.9.3.

In 1974, Congress passed the Safe Drinking Water Act to regulate the public drinking water supply. The 1996 Amendments mandate that states assess, delineate, and map protection areas for their public drinking water sources and determine potential risks to those sources. The Act does not specifically mandate the protection of source water resources. However, states, tribes, and communities are encouraged to use this information to protect the sources from pollution of major concern and may pass local regulations (EPA, 2004a). Public water resources supply the community surrounding Virginia Avenue SE with drinking water and there are no private wells, source waters, or sole source aquifers located within the LOD.

In compliance with Sections 303(d), 305(b) and 314 of the federal Clean Water Act and the Safe Drinking Water Act, it is the responsibility of the District to develop a prioritized list of water bodies that currently do not meet water quality standards. The Section 303(d) list identifies those water bodies and watersheds that require restoration. The Section 303(d) list does not identify any impaired waters within the LOD. However, local water quality is affected by uncontrolled runoff that causes erosion and allow for roadway contaminates to flow directly into adjacent streams. Outside of the LOD but in the vicinity, the Anacostia and Potomac Rivers are considered impaired due to various pollutants.

Figure 4-12
Water Resources in the General Vicinity of the Project



4.9.1 Surface Waters

4.9.1.1 Navigable Waters

The nearest navigable water to the LOD is the Anacostia River (see Figure 4-12). The Anacostia River flows into the Potomac River approximately three miles southwest of the LOD. No parts of the Anacostia River are located within the LOD, but the river is located approximately 500 feet from the LOD on the east end. Kayaking, canoeing and fishing are permitted in both rivers.

4.9.1.2 Wild and Scenic Rivers

In 1968, Congress passed the Wild and Scenic Rivers Act to preserve rivers with outstanding natural, cultural, and recreational values in a free-flowing condition. In accordance with this law, federal projects are prohibited from supporting actions such as dams or other in-stream activities that would impact a river's free-flowing condition, water quality, or other outstanding resource values. According to the National Park Service (NPS), neither the Anacostia River nor the Potomac River near the LOD is considered to be a Wild or Scenic River System or a Wild or Scenic River.

4.9.1.3 Coastal Zone

The District does not have a designated Coastal Zone and has not developed a Coastal Zone Management Plan (CSMP) under the federal Coastal Zone Management Act of 1972 (CZMA). Federal actions occurring within a designated coastal zone, or with the likelihood to affect any land or water use or natural resource of a designated coastal zone, including cumulative and secondary effects, must be consistent with a federally approved CZMP according to Section 307 of the CZMA and National Oceanic and Atmospheric Administration regulations (15 CFR part 930).

4.9.1.4 Chesapeake Bay Protection

The District has been a partner of the EPA's Chesapeake Bay Program since its inception in 1983. President Obama's 2009 Executive Order 13508 on the Chesapeake Bay included goals for restoring clean water by reducing nitrogen, phosphorus, sediment, and other pollutants; recovering habitat by restoring a network of land and water habitats to support priority species and other public benefits; sustaining fish and wildlife; and conserving land and increasing public access. The District achieved its goal of reducing the controllable portion of nitrogen and phosphorus by 40 percent. In June of 2000, partners of the Chesapeake Bay Program adopted the Chesapeake 2000 Agreement in which the District plans to further reduce nutrient loading and control sediment by limiting its contribution of pollutants to 2.4 million pounds/year of nitrogen, 0.34 million pounds/ year of phosphorus, and 0.006 tons/year of sediment (U.S. EPA, 2010).

4.9.2 Groundwater

The availability of groundwater is largely controlled by the geology of the area. Based on published data sources, the LOD is within the Surficial Aquifer of the Coastal Plain. This surficial aquifer consists of alluvium and artificial fill and river terrace deposits. Fill and terrace deposits encountered in the subsurface investigation borings generally consist of clayey or silty sand with trace gravel, while soil strata encountered below the fill and terrace deposits consist of clays and sands. Monitoring wells show that due to low permeability of the underlying clay soil and influence of surface water infiltration, a shallow "perched" groundwater table exists within the river terrace deposits. This perched groundwater above the natural clay deposits is generally deeper than 20 feet below ground surface. Depth to the water table within the clay varies between 30 feet and 45 feet below ground surface. Drinking water is provided via public water sources. Groundwater withdrawals that occur in the general vicinity of the LOD are primarily for commercial and industrial uses.

4.9.3 Wetlands

Wetlands are jointly defined by the EPA, the U.S. Army Corps of Engineers (USACE), and the District of Columbia as "those areas that are inundated or saturated by surface or groundwater at a frequency and duration sufficient to support, and that under normal circumstances do support, a prevalence of vegetation typically adapted to life in saturated soil conditions" (USEPA, 40 CFR 230.3 and USACE, 33 CFR 328.3; DC Law 5-188; DC Official Code §§ 8-103.04 and 8-103.20). Wetlands that are connected hydrologically to other waterways are regulated by the USACE.

A review of U.S. Fish and Wildlife Service (USFWS) National Wetland Inventory maps and U.S. Geological Survey (USGS) maps for the Washington West and Washington East Quadrangles showed no wetlands within the LOD (see Figure 4-12). The NRCS Soil Survey of District of Columbia (1975) identified urban land (Ub) and Udorthents (U10) within the LOD, which are not hydric soils.

Field investigations conducted on June 18 and 19, 2012 confirmed the finding that no regulated Waters of the US, including wetlands, exist within the LOD. Two small "wet" areas were identified, but neither was determined to be regulated resources. The first area consists of a drainage feature in a wooded area within CSX's Jersey Rail Yard property. This area did not contain hydric soils or hydrophytic vegetation and would not be considered a regulated wetland. The second area is a small ditch approximately 200 square feet in size located within the rail right-of-way near the eastern end of the LOD. This ditch is dominated by common cattail (*Typha latifolia*) and the soil is comprised of fill (i.e., rail ballast) and is therefore not a hydric soil. Additionally, no hydrological connection was found connecting this rail ditch to another jurisdictional waterway, which is an element in identifying regulated wetlands.

Additionally, sporadic railroad ditches at both the eastern and western ends of the LOD along the railroad ballast toe-of-slope were found to sometimes have water. However, these ditch areas did not have hydrophytic vegetation. Additionally, these rail ditches within the LOD were

not hydrologically connected to any other jurisdictional waterways. As such, since these rail ditches did not have the three wetland parameters (i.e., hydrophytic vegetation, hydric soils, and hydrology), it was determined that these ditches are not regulated wetlands. Furthermore, as these railroad drainage ditches were not hydrologically connected to a waterway, it was determined that these ditches were also not regulated as Waters of the United States.

4.9.4 Floodplains

The National Flood Insurance Program defines 100-year floodplains as "areas that will be inundated by the flood event having a one percent chance of being equaled or exceeded in any given year." Executive Order 11988 (Floodplain Management) and 23 CFR 650.11 require that federal actions, to the extent possible, avoid short- and long-term impacts to floodplains and avoid direct or indirect support of floodplain development where a practicable alternative exists.

According to the Federal Emergency Management Agency (FEMA) flood boundary mapping, the eastern and central portions of the LOD do not fall within the 100-year floodplain (see Figure 4-13). However, a small portion of the western portion of the LOD occurs within the 100-year and 500-year floodplains of the Potomac River, which is a tidal waterway that is further west of the Washington Channel. The floodplain flows from the Potomac River through the Tidal Basin and reaches the LOD from the northwest via low-lying areas because there is no associated waterway associated with this floodplain. The Flood Insurance Rate Map (FIRM) map specifically states "Flooding Effects [from] Potomac River" for this floodplain area. The western portion of the LOD is within the floodplain of the Potomac River, but the floodplains of the Washington Channel and Anacostia River (which are geographically closer to the LOD than the Potomac River) do not reach the LOD.

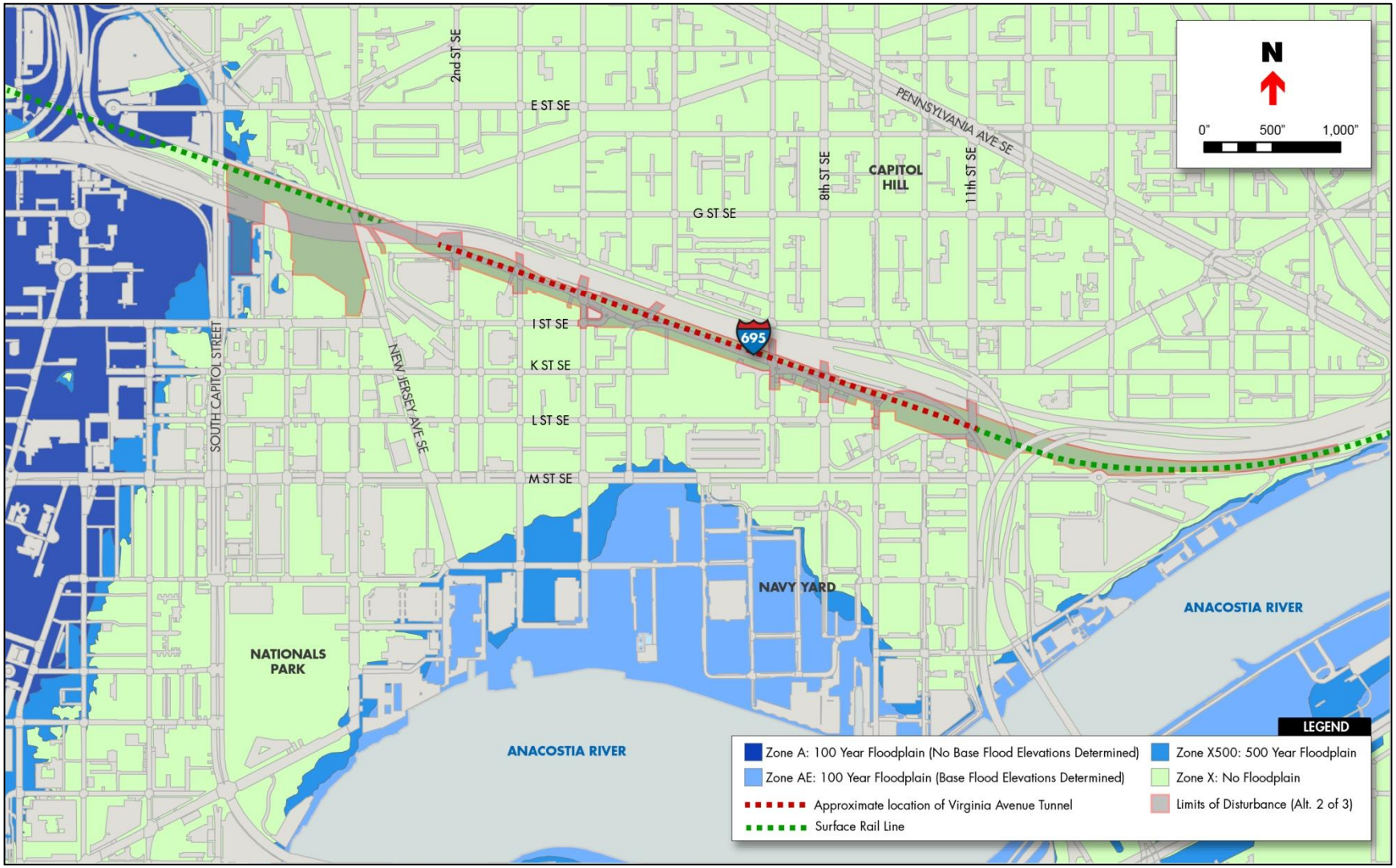
4.10 Vegetation and Wildlife

4.10.1 Flora

As noted in Section 4.1, the Project is located in an urban area, and therefore, flora species in the general vicinity of the LOD are primarily individually planted street trees, ornamental plantings and grassy lawns associated with landscaping within public rights-of-way, and within Virginia Avenue Park, which also contains a community garden. Additional flora species present include stands of existing volunteer and primarily invasive trees on privately-owned, largely undeveloped, properties adjacent to public right-of-way. Individual street trees are also located within commercial, residential, and institutional properties adjacent to public right-of-way. At the east and west ends of the LOD along the edge of the rail right-of-way, the flora consists of invasive trees and vines, and tall grasses.

A field review of trees within the LOD was conducted in the winter and spring of 2012. All individual trees and tree stands (clusters of trees) within the LOD were identified and evaluated. The tree survey identified 404 individual trees and four tree stands. A summary of the health of 404 individual trees surveyed is provided in Table 4-14. Many of the older

Figure 4-13
Floodplains in the General Vicinity of the Project



individual street trees were found to be in fair to poor condition. Many newly planted street trees of less than two-inch caliper were observed. A summary of tree conditions and quantities observed is provided below.

For individual street trees, the tree location was surveyed, and measurements for diameter at breast height (DBH) and diameter of tree canopy were obtained. DBH and diameter of tree canopy measurements were taken using a caliper tape and 200-foot fiberglass measuring tape, respectively. Each individual tree was identified by genus and species. Additionally, the condition of each tree and remarks were noted.

Table 4-14
Summary of Tree Survey

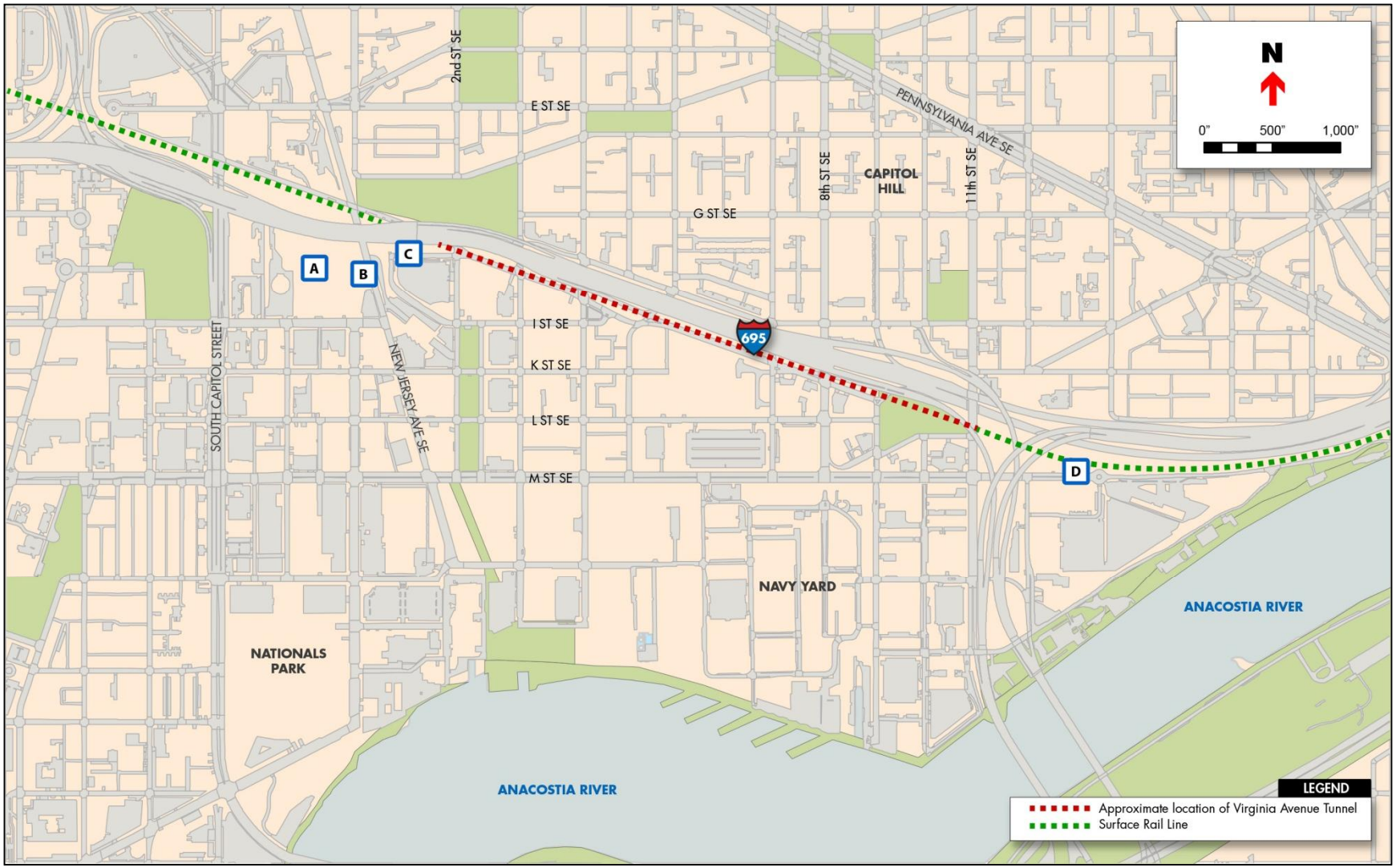
Condition	Quantity Observed
Excellent	1
Good	148
Fair	121
Poor	52
New	65
Dead, Dying or Withered	17
Total	404

The majority of the individual trees within the LOD are also within public right-of-way (street trees), and Virginia Avenue Park. Of the over 400 street trees observed within the LOD, the most prevalent species included willow oak (*Quercus phellos*), northern red oak (*Quercus rubra*), pin oak (*Quercus palustris*), scarlet oak (*Quercus coccinea*), black oak *(Quercus veluntina),* thornless honeylocust (*Gleditsia triacanthos inermis*), silver linden, (*Tilia tomentosa*), Chinese elm (*Ulmus parvifolia*), slippery elm (*Ulmus rubra*), southern magnolia (*Magnolia grandiflora*), tree-of-heaven (*Ailanthus altissima*), and red maple (*Acer rubrum*).

The trees in Virginia Avenue Park include Siberian elm (*Ulmus pumila*), eastern red cedar (*Juniperus virginiana*), American holly (*Ilex opaca*), southern magnolia, river birch (*Betula nigra*), mulberry (*Morus sp.*), red maple, Chinese elm, Kwanzan cherry (*Prunus serrulata 'Kwanzan'*), and cherry (*Prunus sp.*). Trees within Virginia Avenue Park were generally in fair condition; however, those trees observed to be the most successful included Kwanzan cherry and Chinese elm.

Three of the four tree stands identified in the survey are in CSX-owned property. The other is within public right-of-way. The four tree stands are identified as Stands A, B, C and D, and their locations are shown on Figure 4-14. Stands A and B are located within the CSX Jersey Rail Yard. Stand C is located south of I-695 between 1st and 2nd Streets and is partially under the

Figure 4-14
Tree Stands in Project



Southeast Freeway. Stand D is located on the east end of the LOD within CSX property between the rail line and M Street SE.

To characterize the tree stands, the stand location was surveyed and the dominant tree species were identified. DBH, diameter of tree canopy, and condition of each tree were documented for Stands A and C. For Stands B and D, which are located within CSX property, the DBH, diameter of tree canopy, and condition were primarily documented for only those trees that are greater than 17.5-inches DBH. A few trees within these stands less than 17.5" were surveyed; however, these smaller trees are not regulated by DDOT's Urban Forestry Administration. Stand A is also located within CSX property, but all trees were documented regardless of size because this stand was less dense than Stands B and D.

Stand A is characterized by volunteer trees consisting of slippery elm (*Ulmus rubra*), mulberry (*Morus sp*.), cottonwood (*Populus deltoides*), and catalpa (*Catalpa speciosa)*. DBH of these trees range between 5 and 18 inches and are generally in good condition. The trees within this stand are labeled on the tree inventory (see Appendix H) as tree nos. 218-235.

Stand B is located within one of the wet areas described above in Section 4.9.3. This stand was characterized by volunteer trees consisting of tree-of-heaven (*Ailanthus altissima)*, red maple, black locust (*Robinia pseudoacacia*), catalpa, American hackberry (*Celtis occidentalis*), and slippery elm. English ivy (*Hedera helix)* and poison ivy (*Toxicodendron radicans*) were also observed growing on many of the trees. Trees within this stand are generally in good to fair condition and of mixed sizes. The trees within this stand are labeled on the tree inventory as tree nos. 250-255 and 379-390, but note that not all trees within this stand were surveyed since only trees greater than 17.5" DBH are regulated by DDOT's Urban Forestry Administration.

Stand C was characterized by volunteer trees consisting of tree-of-heaven and mulberry. Slippery elm is also present within this stand although it is not dominant. This stand is located beneath I-695 on a steep embankment on the south side of the CSX rail line under the freeway. Trees in this stand are small with an approximate DBH of 2-6 inches and are in fair condition. The trees within this stand are labeled on the tree inventory as tree nos. 282-294 and 378.

Stand D is located on an approximately ten-foot high berm between a dirt roadway along the CSX railroad and M Street SE. This stand consists of slippery elm, black locust, flowering dogwood (*Cornus florida*), Norway maple (*Acer platanoides)*, American sycamore (*Platanus occidentalis)*, and mulberry. Other species observed include poison ivy, *Rubus sp*., and Virginia creeper (*Parthenocissus quinquefolia)*. Trees within Stand D generally have a DBH between 8 and 11 inches and are in fair to good condition. The surveyed trees within this stand are labeled on the tree inventory as tree nos. 356-371, but please note not all trees within this stand were surveyed since only trees greater than 17.5" DBH are regulated by DDOT's Urban Forestry Administration (UFA). UFA requires that an arborist certified by the International Society of Arboriculture (ISA) conduct or certify a tree inventory before tree removal permit could be issued. Typically, the final ISA-certified tree inventory would dictate mitigation requirements.

4.10.2 Fauna

The wildlife species in and near the LOD are likely those that are adapted to live in highly urbanized areas in proximity to humans. Such species include small mammals, such as opossum (*Didelphis virginiana*), gray squirrel (Sciurus carolinensis), eastern chipmunk (*Tamias striatus*), eastern cottontail (*Sylvilagus floridanus*), raccoon (*Procyon lotor*), striped skunk (Mephitis mephitis), woodchuck (Marmota monax),and eastern mole (*Scalopus aquaticus*). Non- native introduced species likely present in or near the LOD include house mouse (Mus musculus) and Norway rat (*Rattus norvegicus*). Bird species that may be found at or near the LOD include American robin (*Turdus migratorius*), Canada goose (*Branta canadensis*), American crow (*Corvus brachyrhynchos*), red-winged blackbird (A*gelaius phoeniceus*), gray catbird (*Dumetella carolinensis*), Northern cardinal (*Cardinalis cardinalis*), northern mockingbird (Mimus polyglottos), mourning dove (*Zenaida macroura*), blue jay (*Cyanocitta cristata*), song sparrow *(Melospiza melodia),* house sparrow *(Passer domesticus)*, and European starling *(Sturnus vulgaris.)* A list of all mammal species commonly found within the District of Columbia is found at the Smithsonian National Museum of Natural History website, and a list of all bird species is found at the Audubon Society of the District of Columbia website.

Several species of bats are also found throughout the District, and may potentially be found in the general vicinity of the LOD, including within the tunnel. The species most commonly found within the District include big brown bat (*Eptesicus fuscus*), silver-haired bat (*Lasionycteris noctivagans*), red bat (*Lasiurus borealis*), hoary bat (*Lasiurus cinereus*), Eastern small-footed myotis (Myotis leibii), little brown bat (*Myotis lucifugus*), Northern long-eared myotis (*Myotis septentrionalis*), evening bat (*Nycticeius humeralis*), and Eastern pipistrelle (*Pipistrellus subflavus*). Certain bat species roost within caves, such as the big brown bat (*Eptescicus fuscus*), Northern long-eared myotis (*Myotis septentrionalis*), and Eastern pipistrelle (*Pipistrellus subflavus*), while the other bat species within the District roost within trees. No bats were observed within the LOD, including the tunnel, during the field visits. However, this does not necessarily mean that bats do not roost or feed within or near the LOD, including the tunnel.

A field investigation was conducted on June 18 and 19 for wetland identification and tree survey. During these investigations, observations of wildlife in the project corridor were also documented. A Composite Species List that shows the typical species found in the general vicinity of the LOD based on the site's characteristics (i.e. disturbed, urban environment) and which species were actually observed is included in Appendix H.

The LOD is located within the Atlantic Flyway, an important pathway for migratory birds. Many migratory birds rest and feed in the Chesapeake Bay during their annual migration, but some species of birds winter in the Chesapeake Bay while other species breed there during the spring. For example, ospreys have been known to nest on bridges and construction equipment along the Anacostia River and Anacostia Park, which is located east of the Anacostia River. Although the LOD lies is within the Lower Anacostia River Watershed, it does not provide ideal habitat for migratory bird species, which tend to prefer mature forests, fields, and wetlands or as noted above with the osprey, tend to prefer being immediately near river corridor.

4.10.3 Threatened and Endangered Species

The USFWS "Federally Listed Endangered and Threatened Species – District of Columbia" list shows that the only endangered species within the District is Hay's spring amphipod (*Stygobromus hayi*). Amphipods are crustaceans related to lobsters and crabs, but they are much smaller. Hay's spring amphipod is a small aquatic amphipod inhabiting an underground aquifer in an urban area. Habitat for this species does not exist within the LOD.

A field study of the LOD determined that no suitable habitat exists for potential endangered or threatened species as the LOD is mostly developed roadway and freight rail right-of-way.

Correspondence with the USFWS was conducted to determine if any endangered or threatened species are documented within or adjacent to the LOD. In a letter dated June 11, 2012, the USFWS has determined that "except for occasional transient individuals, no proposed or federally listed endangered or threatened species are known to exist within the project impact area", and that no further consultation is required (see Appendix A). Additionally, the USFWS mentioned that while the bald eagle (*Haliaeetus leucocephalus*) has been delisted it is still protected under the Bald and Golden Eagle Protection Act. Bald eagles have increased within the Chesapeake Bay area and have been seen within the District. However, no bald eagles were observed during field visits.

In addition to coordination with the USFWS, DDOT sought input from the NPS and the DDOE through correspondence dated July 12, 2012 and June 22, 2012, respectively (see Appendix A).

The NPS was asked if it had any information regarding protected species within the general vicinity of the LOD, and any if they had any concerns related to protected species. In a letter dated July 18, 2012, the NPS responded that it was not aware of any such species along the LOD.

The DDOE was asked if any District-listed or proposed threatened or endangered plant or animal species and/or any critical habitats that may occur in or adjacent to the LOD and if there are any concerns related to *Species of Greatest Conservation Need (SGCN).* In a letter dated July 13, 2012, the DDOE responded that there are no known or proposed federally-listed threatened or endangered species within the LOD. However, there are several *SGCN* species neighboring the LOD. The following four species are currently designated as SGCN: American toad *(Bufo americanus), r*edbelly turtle (*Pseudemys rubriventris), e*astern small-footed bat *(Myotis lebii),* and little brown bat *(Myotis lucifugus).* Additionally, the following three species are proposed for listing as SGCN species: green frog *(Lithobates clamitans), g*ray treefrog *(Hyla versicolor),* and southern Leopard Frog *(Rana sphenocephala).* DDOE recommended that contractors be alert and considerate of all wildlife species that may be encountered during project implementation. DDOE also identified several non-SGCN birds in the area including northern mockingbird, American robin, song sparrow, house sparrow, and European starling.

4.11 Historic and Archaeological Resources

4.11.1 Section 106 Process

The federal approvals associated with the Project are subject to compliance with the National Historic Preservation Act (NHPA) of 1966, as amended (16 USC 470 et seq.), and its implementing regulations (36 CFR 800). NHPA Section 106 requires that the federal agency responsible for an undertaking (the Project) consider the effects of its actions on historic properties. Historic properties are those which are listed in or determined eligible for listing in the National Register of Historic Places (National Register). Historic properties could include historic-period resources (e.g., existing buildings or structures) as well as below-ground archeological resources of historic (e.g., early American) or pre-historic (e.g., pre-contact Native American) origins.

In accordance with Section 106 requirements, the lead federal agency, in consultation with the State Historic Preservation Officer (SHPO), designates an area of potential effects (APE), identifies historic properties (i.e., NRHP-listed and NRHP-eligible) in the APE, and makes determinations of the proposed project's effect on historic properties in the APE. If a property is generally more than 50 years of age and possesses historic significance and integrity, the property is deemed eligible for the NRHP during Section 106 review. Properties that are determined eligible and those that are listed in the NRHP are afforded the same consideration in the Section 106 process.

Section 106 regulations require that the lead federal agency consult with the SHPO and consulting parties with interests in historic properties during planning and development of the proposed project. The federal Advisory Council on Historic Preservation (ACHP) may participate in the consultation or may leave such involvement to the SHPO and other consulting parties. The consulting parties are provided opportunities to comment on the proposed project and its effects on historic properties, and the federal agency must consider these comments. The federal agency, SHPO, ACHP (if participating), and other consulting parties seek ways to avoid, minimize, or mitigate adverse effects. If the agency officials, the SHPO and the ACHP agree on how the adverse effect will be resolved, they develop a Memorandum of Agreement (MOA) or Programmatic Agreement (PA). The MOA or PA stipulates the measures to be taken to avoid, minimize or mitigate the adverse effect.

If a National Historic Landmark (NHL) is located within the APE and would be adversely affected by the project, the federal agency must also comply with Section 110(f) of the NHPA. Section 110(f) requires that the agency undertake, to the maximum extent possible, planning and actions to minimize harm to any adversely affected NHL and afford the ACHP an opportunity to comment. In accordance with 36 CFR 800.10(c), the agency must notify the Secretary of the Interior of any consultation regarding an NHL and invite the Secretary and the ACHP to participate in consultation when an adverse effect to an NHL may occur.

With the establishment of the APE, potential historic properties are then identified within this area. If no historic properties are present within the APE or historic properties may be present

but the undertaking will have no effect on them, a "no historic properties affected" determination may be rendered by FHWA (36 CFR 800.4(d)(1)).

Historic properties were identified in the Project's APE, and therefore, the "no historic properties affected" determination would not apply to this Project.

The glossary in the Table of Contents provides definitions of the Section 106 terminology used in this section as well as in Section 5.11.

4.11.2 Historic Properties

The APE for the Project was initially developed in consultation with the DC SHPO during a meeting in March 2012, and then subsequently refined to consider recent project refinements and consulting party commentary received in May 2012. The boundary of the APE encompasses all historic properties and other parcels that could potentially be affected by the Project and adheres to the information contained in 36 CFR 800. Effects considered in this APE delineation include direct physical impacts, visual effects, and potential noise and vibration impacts. The APE is shown in Figure 4-15. It is centered to the LOD. Starting from South Capitol Street, the northern boundary of the APE is formed by Virginia Avenue SE, New Jersey Avenue SE, E Street SE and Pennsylvania Avenue SE. The eastern boundary is formed by 13th Street SE and extends into a portion of the CSX rail right-of-way where it is bounded by the Southeast-Southwest Freeway and M Street SE. The southern boundary of the APE encompasses a portion of the Washington Navy Yard and extends along L Street SE until 4th Street SE where it extends along K Street SE. The western boundary of the APE extends along Half Street SW but encompasses Randall Junior High School and Randall Recreation Center, meeting the northern boundary of the APE at Virginia Avenue SE. In addition to the APE, the locations of the historic properties within the APE are shown in Figure 4-15. Table 4-15 provides brief descriptions of each of these historic properties in the APE.

To determine the potential that Project could affect below-ground archeological resources, a series of archeological technical studies were conducted. It should be noted that the APE described above is not the same for identifying below-ground archaeology resources because such resources could only be affected if disturbed by ground-disturbing activities, such as excavation or trenching.

A Phase I Cultural Resources Survey was conducted in 2009 prior to the initiation of the NEPA and Section 106 processes. One of the purposes of this report was to evaluate the potential that certain locations within the LOD may contain archeological materials with sufficient integrity to be eligible for the National Register. A Phase IB archeological field survey was conducted in 2011 to determine the presence of buried deposits showing evidence of historic and or prehistoric use (John Milner Associates, Inc., 2011). The sites identified for testing were Reservations 122 and 126 (Virginia Avenue Park), both of which are parks (see Section 4.12). The testing, which involved mechanical borings, revealed that subsurface conditions of these two areas are highly modified urban landscapes with high levels of subsurface disturbance. No intact archaeological deposits were found. The survey recommended that no additional

Figure 4-15
Historic and Archeological Features

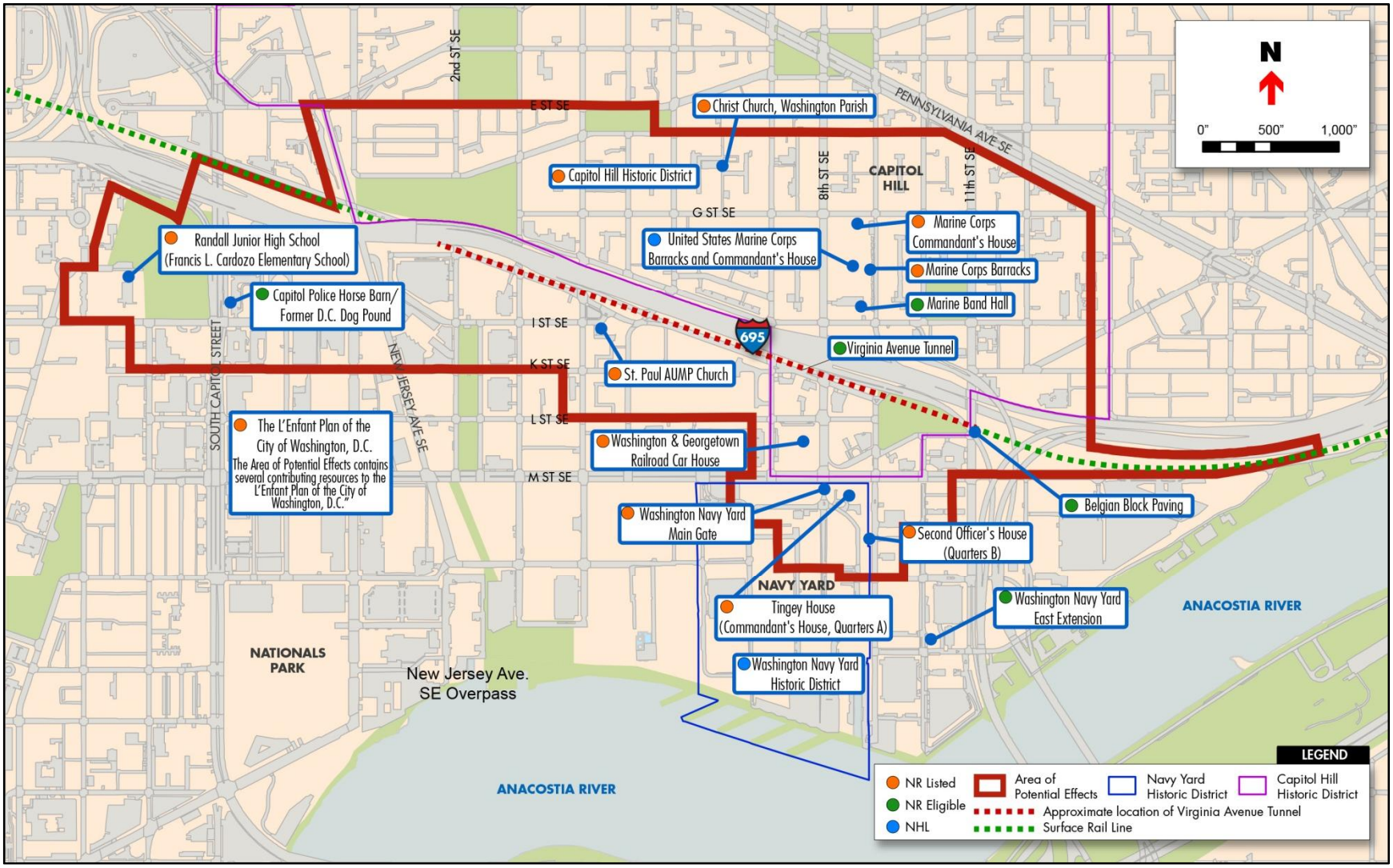


Table 4-15
Historic Properties in the Area of Potential Effects

Historic Property	Location & Build Date	Description	National Register Status / Criteria
L'Enfant Plan of Washington, D.C. 	Roughly bounded by Florida Avenue from Rock Creek NW to 15 Street NE, south to C Street, and east to the Anacostia River 1792, 1902	Baroque city plan with Beaux Arts modifications. Designed by Pierre L'Enfant. Regular orthogonal grid with numerically and alphabetically designated streets, intersected by diagonal avenues. Historic and contemporary system of parks and medians. 1901-02 McMillan Commission recommendations resulted in physical changes for urban development.	Listed A, B, C
Capitol Hill Historic District 	Roughly bounded by the U.S. Capitol; F Street NE and Constitutional Avenue to the north; 14TH, 13th, and 11th streets SW to the east, and the Washington Navy Yard and I-695 to the south Late 18th to mid 20th century	Primarily a residential area with 2 to 4-story row houses and small frame houses in a variety of architectural styles including Federal, Italianate, Greek Revival, Queen Anne, Romanesque Revival, and vernacular interpretations. Began as boarding house community for members of Congress. One of the city's oldest and its largest residential communities. Includes contributing religious, commercial, institutional, and military buildings as well as several parks.	Listed A, C
Randall Junior High School 	*(Francis L. Cardozo Elementary School)* 61 I Street SW 1906, 1912, 1927; later alterations date from 1932-1973	1906 main block building is a 2-story, 7-bay-wide structure clad in red brick. Flemish bond with limestone trim and detailing accessed by a Colonial Revival entrance. Similar freestanding building (1912) in red brick was later attached to the main building via the west wing (1927). One-story red brick east wing (1927) houses the auditorium. Later additions do not contribute to significance.	Listed A, C

Table 4-15 (Continued)
Historic Properties in the Area of Potential Effects

Historic Property	Location & Build Date	Description	National Register Status / Criteria
Washington Navy Yard Historic District 	8th and M streets SE (Main Entrance); bounded by the Anacostia River to the south 19th to 20th Century	Late Victorian-era 42 acre district, includes approximately 45 major historic buildings and structures as well as numerous support buildings. Design initiated by Benjamin Latrobe—selected by Thomas Jefferson. Served as a site for naval shipbuilding and later for naval gun manufacture. Individually listed properties within the district include the Main Gate, Tingey House (Commandant's House, Quarters A), and Second Officers House (Quarter's B).	Listed (Also NHL) A, B, C
Washington Navy Yard Main Gate 	8th and M streets SE 1805-06	Greek Revival structure that was incorporated into the façade of a 3-story Late Victorian-era building (1880-81). Clad in Flemish bond brick, heavily stuccoed and painted white. Designed by Benjamin Latrobe.	Listed (Contributing Resource to Navy Yard Historic District) A, C
Tingey House (Commandant's House, Quarters A) 	East of the Main Gate and South of M Street SE within the Washington Navy Yard 1804	2.5-story Flemish bond brick structure. Originally a late Georgian townhouse. Altered during the Victorian era by the addition and lengthening of windows.	Listed (Contributing Resource to Navy Yard Historic District) A, B, C

Table 4-15 (Continued)
Historic Properties in the Area of Potential Effects

Historic Property	Location & Build Date	Description	National Register Status / Criteria
Second Officer's House (Quarters B) 	Charles Morris Avenue within the Washington Navy Yard 1801	2.5-story Federal style gabled roof brick structure painted white; two flat-roof verandas project from the façade; has been substantially enlarged twice (dates unknown).	Listed (Contributing Resource to Navy Yard Historic District) A, C
Washington Navy Yard East Extension 	Bounded by M Street SE to the north, the Anacostia River to the south, and 2nd Street SE to the west 1902-1945	Eastward development of the existing Washington Navy Yard beginning in 1902 with the most comprehensive building campaign dating from circa 1918-1944. Work conducted in this portion of the Navy Yard was critical to naval weapons development and testing during World Wars I and II.	Eligible A, C
Washington & Georgetown Railroad Car House 	770 M Street SE 1891, 1909	Romanesque Revival style building clad in brick with concrete detailing. Original façade is extremely ornate and features semi-circular arches, a parapet, blind arrow slits, and angle towers. An addition is less ornate but mimics the medieval stylistic references of the original building. Only extant Washington & Georgetown Railroad Company facility.	Listed A, C

Table 4-15 (Continued)
Historic Properties in the Area of Potential Effects

Historic Property	Location & Build Date	Description	National Register Status / Criteria
Christ Church, Washington Parish 	620 G Street SE 1806-07, 1924	2.5-story Gothic Revival style rectangular plan building, stuccoed exterior with a 3-story square bell tower. Has been enlarged and altered since 1806-07. The City's first Episcopal parish designed by Robert Alexander. Often attributed to Benjamin Latrobe.	Listed A, C
St. Paul AUMP Church 	410 I Street SE 1924	1.5-story Gothic Revival style rectangular church, with gabled asphalt roof, arched windows, crenellated battlements, and a tower. Washington's second licensed African American architect, R.C. Archer Jr., designed the church. The only church in Washington that evolved from the oldest incorporated, independent African denomination in the United States.	Listed A, C
United States Marine Corps Barracks and Commandant's House 	Bounded by I Street SE to the north, 8th Street SE to the east, G Street SE to the south, and 9th Street SE to the west Early 19th to early 20th century	Oldest continually active Marine Corps instillation in the United States. Rectangular enclosed site with a central parade ground. Contributing properties include: Commandant's House, Barracks and Band Hall, and Officers' Quarters, a row of five houses located on the west side of the post. Barracks and Band Hall and Officer's Quarters are all clad in red glazed brick.	Listed (Also NHL) A, B, C

Table 4-15 (Continued)
Historic Properties in the Area of Potential Effects

Historic Property	Location & Build Date	Description	National Register Status / Criteria
Marine Corps Commandant's House 	801 G Street 1801-06, 1840, 1891SE	2.5-story Federal style Flemish bond brick painted white structure. Later historic alterations include the brick addition at the northeast corner (1840) and mansard roof and hooded dormers (1891).	Listed (Contributing resource to Marine Barracks Historic District) A, C
Marine Corps Band Hall 	8th and I Streets SE 1903-07	2.5-story south range of barracks is commonly referred to as the Band Hall. First floor contains a guard shack, band offices, and the Sousa Band Hall.	Eligible A, B, C
Marine Corps Barracks 	8th and I Streets SE 1903-07	Two ranges of barracks border the south and east sides of the rectangular site. Both barracks possess an arcaded loggia, uniform limestone stringcourse, and a hipped roof. 2.5-story east range of barracks feature two 2.5-story pavilions and one 3.5-story pavilion that project beyond the façade. Replaced original barracks that were built in 1802.	Listed (Contributing resource to Marine Barracks Historic District) A, C

Table 4-15 (Continued)
Historic Properties in the Area of Potential Effects

Historic Property	Location & Build Date	Description	National Register Status / Criteria
Virginia Avenue Tunnel 	Located beneath Virginia Avenue between 2nd and 11th Streets SE 1872, 1904	Constructed by the Baltimore & Potomac Railroad with a cut and cover method in 1872. Later extended in 1904; Approximately 3,800 feet in length. Provides railroad access to the District.	Eligible A, C
Capitol Police Horse Barn/Former DC Dog Pound 	Intersection of I Street SW and South Capitol Street Ca. 1915-1925	1-story I-plan utilitarian building clad in brick with a wide entry (infilled) and five stall openings along the west elevation. 1943 map labels building as "DC Pound," but originally built as Capitol Police Horse Barn.	Eligible A, C
Virginia Avenue Paving – Site No. 51SE062 	11th Street Bridges Right-of-Way 1860-1870	Within the previous Virginia Avenue SE right-of-way, the site includes three surviving segments of cut stone block paving. The site probably dates back to the Boss Shepherd period of the District's history and his infrastructure improvement programs. It is significant as a physical part of the L'Enfant Plan of Washington, DC.	Eligible A, B

archeological investigations be conducted. The DC SHPO concurred with the recommendations and conclusions of the survey.

Archaeological investigations conducted as part of the 11th Street Bridges project identified two archeological sites (51SE057) and (51SE062) within the right-of-way the bridges, and both of which are within the Project's LOD. 51SE057 is a late 19th or early 20th century midden that was determined ineligible by the SHPO. 51SE062 is an old section of Virginia Avenue SE, consisting of intact cut block paving probably constructed between 1860 and 1870. The site is significant due to its physical association with the L'Enfant Plan of Washington, DC.

4.12 Public Parks and Recreational Resources

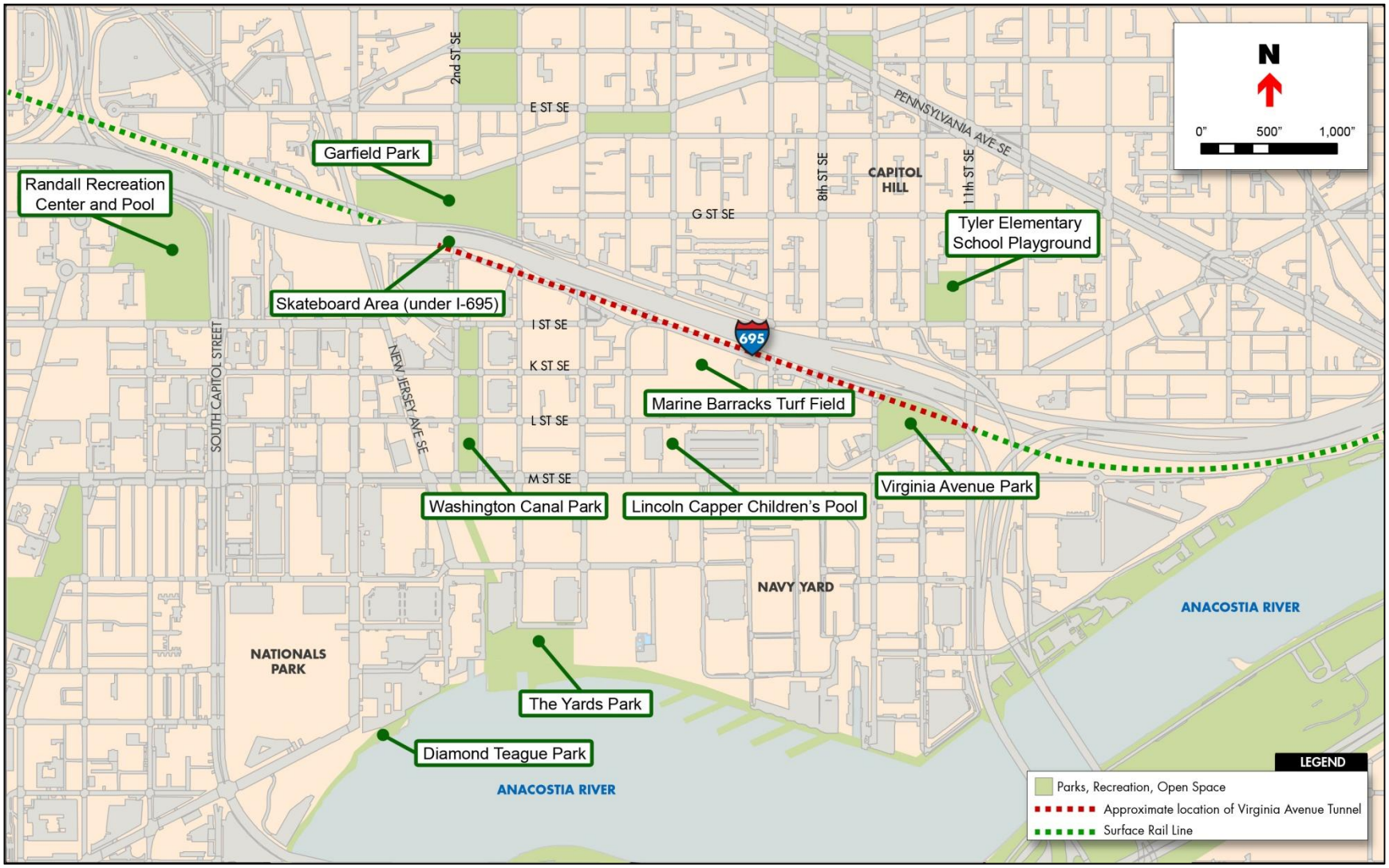
The District contains 9,300 acres of park and open space, almost one quarter of the city's land area. The existing park system comprises a wide variety of park types, sizes, and facilities, and shared jurisdiction between local and federal agencies. The NPS owns the land underlying or controls almost 74 percent of parkland in the District or more than 6,800 acres, which includes Rock Creek Park, the National Mall, Anacostia Park, and smaller parks such as the Virginia Avenue Park. The DC Department of Parks and Recreation (DPR) owns and/or manages four large parks or "conservation-oriented open spaces", 69 recreational centers, 31 swimming pools, and more than 200 neighborhood and triangle parks containing playgrounds, athletic fields and tennis courts. Various federal and local agencies control the remaining 16 percent (1,500 acres) of open space, including the National Zoo, National Arboretum, public school playfields, and cemeteries. The U.S. Department of Defense controls the Marine Barracks Turf Field located at 1009 7th Street, SE, which is near to Virginia Avenue SE.

Figure 4-16 show the locations of parks and recreational facilities in the general vicinity of the LOD. Those that are within or adjacent to the LOD are: Virginia Avenue Park, the Marine Barracks Turf Field, Garfield Park, and an ad hoc skateboard area.

Virginia Avenue Park is the only park or recreational facility within the LOD. The NPS owns the real estate, but the park is maintained and operated by the DPR. The 2.63-acre park is located between 9th Street SE and near 11th Street SE and between I-695 and Potomac Avenue SE / L Street SE. It contains the Virginia Avenue Community Garden, a fenced dog area, and passive recreational amenities that include grassy fields, park benches and picnic tables. The community garden offers residents opportunities to grow herbs, vegetables and fruits. Each participating household is limited of two plots.

The Marine Barracks Turf Field is located within the Marine Corps Recreation Facility, which is adjacent to Virginia Avenue SE within the 700 block. The field is primarily used by Marines for physical fitness and the Marine Band for practice sessions. However, it is also made available to Sports on the Hill, a volunteer youth sports organization, and other visiting recreational teams and spectators with prior approval by the facility.

Figure 4-16
Parks and Recreation Facilities



Garfield Park is located near the LOD at 2nd Street SE. It is one of the 17 original federal appropriations (Reservation 17) purchased by the federal government in 1792 and is described by location and function in a note accompanying Andrew Ellicott's engraving of the L'Enfant Plan. Today, the park features passive recreational amenities, such as park benches, a children's playground, two tennis courts, volleyball area, two bocce ball courts, and historical elements. A Garfield Park connector is proposed by DDOT, which would better connect Garfield Park with the Anacostia Riverfront and Canal Park for cyclists and pedestrians.

Virginia Avenue Park on north side of Community Garden

An informal or ad hoc skateboarding area is located under the elevated I-695 between Garfield Park and Virginia Avenue SE in the vicinity of 2nd Street SE. In addition, to containing a basketball board and rim, this area under the freeway has several skateboarding accoutrements erected by the skateboarders themselves, which include quarter pipes, launches and ramps. This area is not listed as an official park or recreation facility by the District or the federal government.

Other parks and recreational facilities in the general vicinity of the LOD include:

- Lincoln Capper Children´s Pool/ Joy Evans Therapeutic Recreation Facility: offers a wide variety of recreation, leisure and educational programs, therapeutic aquatics, and a computer learning center;
- Randall Recreation Center & Pool: includes a pool, tot lot, playground, basketball court, and three tennis courts;
- Washington Canal Park: includes a café, water fountains, ice-skating rink, and programmed attractions such as a farmer's market and holiday festivals;
- The Yards Park: includes a terraced performance venue, biking/jogging trails and seating areas; and
- Tyler Elementary School Playground.

4.13 Visual and Aesthetic Conditions

The visual and aesthetic conditions within the LOD are enhanced by the street trees that line both sides of Virginia Avenue SE between 2nd and 9th Streets SE (see Section 4.10 for further information). Other visually-enhancing elements within the LOD include the open space provided by Virginia Avenue Park, Reservation 122 and other landscaping within the public rights-of-way of Virginia Avenue SE. In addition to its grassy fields, Virginia Avenue Park supports several small to medium sized trees of different species and a community garden that enhances the overall aesthetics of the park and area (see photograph). In other areas of the LOD, in particular the blocks between 3rd and 5th Streets SE, extensive landscaped areas are present between Virginia Avenue SE and the row houses that line the street within these blocks (Capitol Quarter). These landscaped areas are well manicured and provide setbacks of several dozen feet between the street and the residences depending on the location. A triangular lawn, located at Virginia Avenue SE and 4th Street SE, which is part of Reservation 122, contributes to this setback and visually appealing section of Virginia Avenue SE. The grassy lawn is surrounded recently planted trees. It principally provides roadway landscaping, open space and visual relief from the nearby I-695, which is elevated above Virginia Avenue SE. The urban design, including its size and scale, of the Capitol Quarter row houses is consistent with the urban architecture of the Capitol Hill neighborhood on the north side of the freeway, even though the residences are very new. With its historic two to four-story row houses in a variety of architectural styles, Capitol Hill is considered to be a visually attractive neighborhood.

Virginia Avenue Park's Picnic Benches along Potomac Ave. SE

Within the LOD, I-695 presents the major visual element that detracts from the more enhancing visual and aesthetic characteristics described above. I-695 is located immediately north of and parallel to Virginia Avenue SE, and is elevated above the street grid. It both physically and visually divides the community, and is the most noticeable visual element along Virginia Avenue SE between 2nd and 9th Streets SE. In some locations, I-695 or the retaining walls for the freeway's ramps are located just a few feet from the street's northern curb. From perspectives

along Virginia Avenue SE between 3rd and 5th Streets SE, I-695 presents a visual contrast with the residences of Capitol Quarter (see photograph). However, the street trees do provide some level of visual relief between the two differing land uses.

I-695 to the Left; Capitol Quarter Row Houses to the Right

The other visual element within the LOD that detracts from the enhancing visual characteristics described above is where Virginia Avenue SE transitions to one-way operations (between 5th/6th and 8th Streets SE). This section of Virginia Avenue SE presents a visual and aesthetic departure from the more neighborhood or local street characteristics found between 3rd and 5th Streets SE. The reasons for this visual departure include the change in roadway geometrics (conversion to four lanes in one direction), the effects of relatively high traffic volumes existing I-695 at the 6th Street off-ramp, and the change in land use, in particular the Marine Corp Recreation Facility, which occupies most of the 600 block of Virginia Avenue SE. As a military facility, it has an "institutional" appearance including its iron fencing set along the edge of Virginia Avenue SE, which is needed for security

I-695 to the Left; Fencing of the Marine Corp Recreational Facility to the Right

reasons. Because of this change in visual and aesthetic character, I-695 does not present as near a visual contrast as what occurs near Capitol Quarter (see photograph). Again, the street trees do provide some visual relief from the visual impacts of both I-695 and the Marine Corp fencing.

Based on the visually-enhancing elements described above, two viewsheds within the LOD are notable: views within Virginia Avenue SE between 2nd and 5th/6th Streets, and views at or near Virginia Avenue Park. Although the residential portion extends only between 3rd and 5th Streets SE, the block between 2nd and 3rd Streets SE shares many of the same characteristics even though the south side land use is an office building.

4.14 Utilities

The LOD contains several utility infrastructure systems, such as combined sewer overflow (CSO), water, electrical, and natural gas lines, including support facilities (e.g., manholes). Specifically, major utility lines running through the LOD include major CSO lines connecting to the O Street Pump Station and major electric and communication lines running through and in the vicinity of Virginia Avenue Tunnel.

In most cases, each utility infrastructure type is owned and operated by a single organization: water, sewer and CSO lines are owned and maintained by DC Water; gas lines are owned and maintained by Washington Gas; and electric lines are owned and maintained by Pepco. Most of the communications infrastructure in the general vicinity of the LOD is owned by Verizon. Other communications companies lease conduit space from Verizon or in some cases Pepco. Among the exceptions is a communications conduit owned by AboveNet that runs along the rail right-of-way and a duct bank that runs along 3rd Street SE that is owned by Level 3.

4.15 Transportation

The section describes the existing transportation conditions in the general vicinity of the LOD. The transportation topics include freight infrastructure and operations, roadway characteristics, traffic, parking, pedestrian and bicycle and facilities, and transit facilities and services.

4.15.1 Freight Infrastructure and Operations

Section 1.2 of this Draft EIS provides a general description of the freight and passenger rail network in the District, and describes how the Virginia Avenue Tunnel fits into the freight rail network in the District, the Washington Metropolitan Area and the states in the eastern United States. Section 1.2 also describes how Virginia Avenue Tunnel is an important key link in the rail network connecting ports and markets throughout the Mid-Atlantic and Midwest states. As noted in this section, Virginia Avenue Tunnel is exclusively used for freight operations. In addition to these rail lines, a spur line in the vicinity of South Capitol Street provides service to the U.S. Capitol Power Plant, which needs periodic coal shipments.

Currently, an average 18 freight trains a day pass through the Virginia Avenue Tunnel, ranging from 12 to 30 trains. In order to meet shipper requirements for pick-up and delivery and to facilitate the overall operation of the network, substantial variations in daily train counts occur depending on the day of week and season. During heavy traffic periods, 20-30 trains pass through the tunnel in a 24 hour period.

Most of the trains using the Virginia Avenue Tunnel are intermodal container and merchandise trains, accounting for over 80% of the freight loads that transit through the tunnel. Customers of these freight shipments (many of them are retailers) demand strict service commitments in terms of timeliness, consistency and reliability.

4.15.2 Roadway Network

The area surrounding the Project contains several major roadways that are important transportation corridors not only for traffic moving to and from areas within Washington, DC, but also for traffic moving through Washington, DC to reach other destinations in the Metropolitan Washington Area and throughout the east coast of the U.S. (see Figure 4-17).

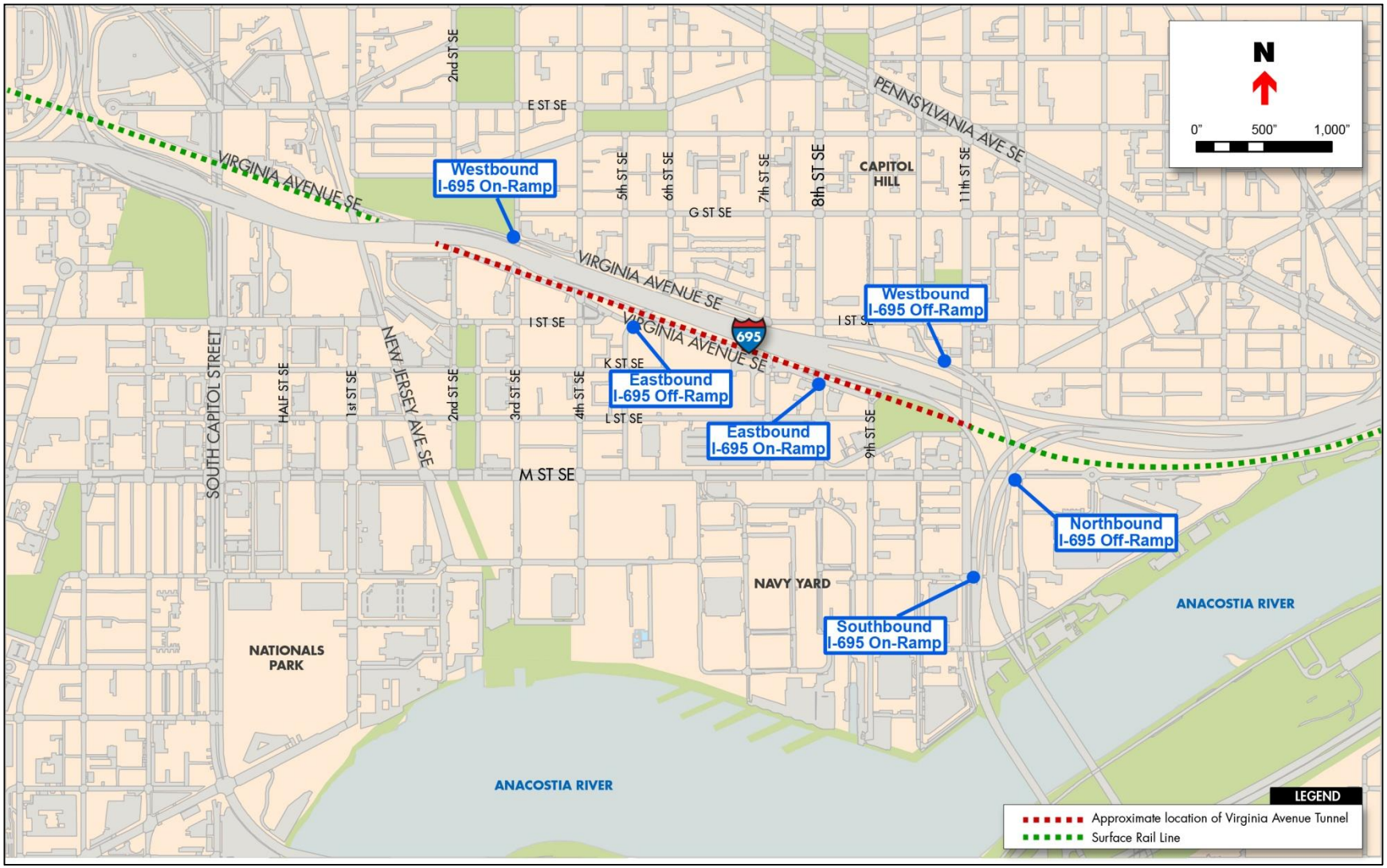
Speed limits of the roadways in the general vicinity of the LOD range from 25 mph for most local roads to 45 mph on I-695. In general, the majority of the roadways in the general vicinity of the LOD are two-lane roads (25 mph speed limit) with parking lanes. Within the general vicinity of the LOD, roadway intersections involving larger roadways (i.e., arterial or major collector roads) are typically signalized and intersections involving only minor roadways (i.e. local neighborhood streets) are typically stop-sign controlled.

Descriptions of Virginia Avenue SE and other notable roadways in the general vicinity of the LOD are provided below.

Virginia Avenue SE

As noted previously, Virginia Avenue Tunnel is generally beneath the mostly eastbound Virginia Avenue SE between 2nd and 9th Streets SE on the south side of I-695. As all "state-named" streets indicate in Washington, DC, Virginia Avenue SE is a diagonal-oriented street, and therefore, is not perfectly eastbound. It is oriented in a moderately southeast direction. The westbound Virginia Avenue SE is parallel to the eastbound Virginia Avenue SE, but is aligned along the north side of I-695. The section of Virginia Avenue SE immediately west of 2nd Street SE to South Capitol Street is currently closed off by the Architect of the Capitol. From 2nd to 4th Streets SE, Virginia Avenue SE is a two-lane (two-way) collector road. From 4th to 5th Streets SE, Virginia Avenues SE converts to a two-lane eastbound only collector road with an alignment that arcs slightly south due to the embankment of the I-695 off-ramp at this location. The alignment is re-established at the 5th Street SE intersection. The 5th and 6th Streets SE intersections with Virginia Avenue SE are combined into one intersection, forming a diagonal one-way (northbound) intersection. The 5th/6th Streets intersection also provides a connection for traffic exiting I-695 on the ramp noted above. From 5th/6th to 8th Street SE, Virginia Avenue SE continues as a one-way eastbound collector road, but the number of lanes expands to four.

Figure 4-17
Roadway Network



A connection to the eastbound on-ramp to I-695 is provided at the 8th Street SE intersection. From 8th to 9th Streets SE, Virginia Avenue SE continues as a one-way eastbound collector road, but the number of lanes drops to two.

On the eastbound only segment of Virginia Avenue SE (south of I-695), the intersections with 2nd, 3rd, 4th and 9th Streets SE are controlled by stop signs, while the intersections with 5th/6th 7th and 8th Streets SE are signalized. On the westbound only segment (north of I-695) the intersections with 3rd, 4th, 6th, and 7th Streets SE are all signalized.

The majority of traffic using Virginia Avenue SE are exiting or entering I-695. Users include residents of Capitol Hill and workers traveling between the freeway and places of employment located in the general vicinity of the LOD, such as the Navy Yard.

Interstate 695

I-695 is a six-lane, divided interstate highway with a speed limit of 45 mph. I-695 is a segment of the Southeast/Southwest Freeway that spans approximately two miles, beginning where I-395 enters the Third Street tunnel and extending across the Anacostia River, via the 11th Street Bridges, where it terminates at the interchange with I-295 and DC 295. In the vicinity of Virginia Avenue SE, I-695 is elevated above the street grid, allowing north-south cross streets from New Jersey Avenue SE to 11th Street SE. As noted in Section 4.1.2, the segment of the Southeast/Southwest Freeway located between the 11th Street Bridges and Barney Circle may be converted into a boulevard, but is currently a segment of the Southeast/Southwest Freeway, which is now closed as part of the 11th Street Bridge Project (see Section 4.1.2). This forced the closure of an on-ramp near the intersection of Virginia Avenue SE and 9th Street SE.

I-695 has the following ramps in the general vicinity of the LOD:

- Two-lane eastbound off-ramp from that connects to the intersection of eastbound Virginia Avenue SE and 5th/6th Street SE intersection;
- One-lane eastbound on-ramp to eastbound I-695 (11th Street Bridges) that begins at the intersection of eastbound Virginia Avenue SE and 8th Street SE (currently closed as part of the 11th Street Bridges project, but is scheduled to reopen at a slightly different alignment in 2014);
- One-lane southbound one-ramp to southbound I-695 (11th Street Bridges) that begins at the intersection of 11th Street SE and N Street SE;
- One-lane westbound on ramp to westbound I-695 that begins at the intersection of westbound Virginia Avenue SE and 3rd Street SE;
- One-lane westbound off-ramp to I Street SE just east of 10th Street SE; and
- Two-lane northbound off-ramp to M Street SE from the 11th Street Bridges aligned along 12th Street SE.

Other Roadways

Other notable roadways in the general vicinity of the LOD include M Street SE, New Jersey Avenue SE, South Capitol Street SE, 8th Street SE and 11th Street SE.

M Street SE is an east-west arterial roadway, with a posted speed limit of 25 mph, with the majority of intersection signalized. It is a six-lane roadway (three lanes each direction) with a divided median along the stretch south of the LOD. The third lane (in each direction) for most of the sections of M Street SE is utilized as on-street parking in the off-peak (non-rush) hours that is converted into a third through lane during the peak (rush) hours.

New Jersey Avenue SE is a diagonal street, but is oriented moderately in a north-south alignment with a speed limit of 25 mph. From Independence Avenue SE to N Street SE, New Jersey Avenue is a two-lane (two-way) collector road with on-street parking on each side. New Jersey Avenue SE passes over Virginia Avenue SE and the CSX rail right-of-way on a concrete bridge. I-695 passes over New Jersey Avenue SE immediately south of the rail underpass.

South Capitol Street is a two-way principal arterial oriented in a north-south alignment. In general, South Capitol Street is a six-lane (three lanes each direction) median divided roadway with a posted speed limit of 25 mph to the west of the LOD. South Capitol serves as a major commuter route between southeast DC/Maryland and downtown DC.

8th Street SE is a two-lane (two-way) minor arterial oriented in a north-south alignment. Between Pennsylvania Avenue SE and M Street SE, 8th Street is known as Barrack Row (see Section 4.1), and provides ample on-street parking to facilitate access to the extensive commercial businesses and restaurants along this street.

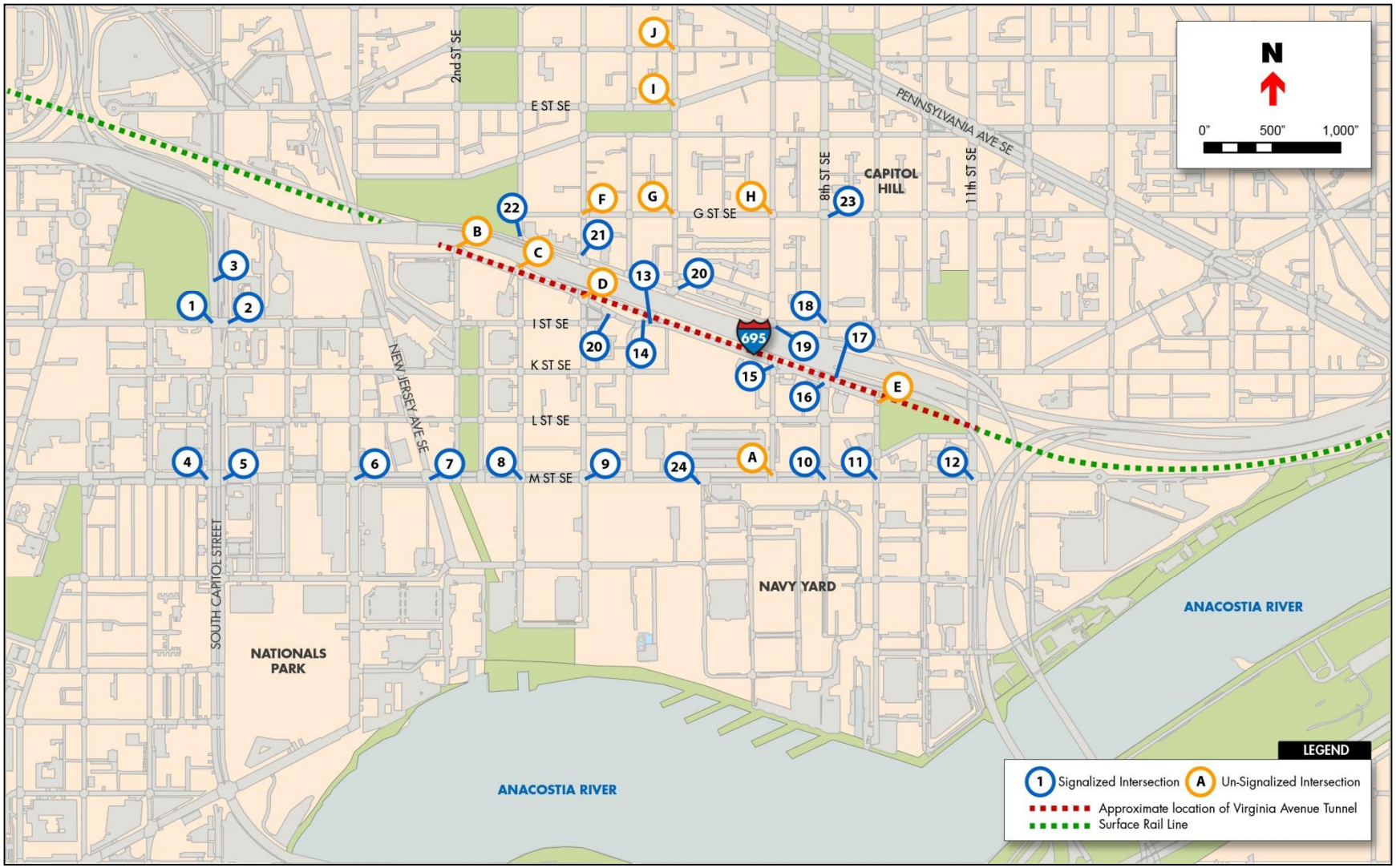
11th Street SE is a four-lane (two-way) minor arterial oriented in north-south alignment. The street provides access between Capitol Hill and I-695 at the 11th Street Bridges.

4.15.3 Traffic Conditions

Traffic counts at over 30 intersections (signalized and unsignalized) in the general vicinity of the LOD were conducted in February and March 2012. The collected data was entered into a traffic modeling software (Synchro) that help analyze traffic operations, such as intersection delay and intersection Level-of-Service (LOS). The locations of these intersections are shown on Figure 4-18.

Level-of-service (LOS) is a measure used to describe the quality of the traffic conditions through a given roadway segment or an intersection. The LOS "grades" are based on the delay experienced by motorists traveling through a roadway intersection or segment during the peak or rush hour. The LOS for a given intersection is affected by factors such as existing traffic volumes and the presence of traffic signals or stop signs. The peak-hour LOS is a measure of the adequacy of the intersection or roadway segment for the particular peak hour. LOS is

Figure 4-18
Analyzed Intersections



measured on a scale of A through F, with "A" representing the best operating conditions and "F" representing the worst operating conditions.

Tables 4-16 and 4-17 present the results of the Synchro analysis of existing traffic conditions at 24 signalized and 10 un-signalized intersections located in the general vicinity of the LOD. In general, the traffic operations at most signalized intersections are acceptable (LOS C or better), except at five signalized intersections:

- South Capitol Street and M Street (southbound intersection): LOS F during AM peak hour;
- M Street SE and 11th Street SE: LOS D during PM peak hour;
- Virginia Avenue SE (eastbound) and 5th/6th Streets SE: LOS D during PM peak hour;
- Virginia Avenue SE (eastbound) and 8th Street SE: LOS D during PM peak hour; and
- Virginia Avenue SE (westbound) and 3rd Street SE/on-ramp to I-695: LOS F during PM peak hour.

Table 4-16
Existing LOS of Signalized Intersections in the General Vicinity of the Project

Location[1]	Intersection Name	LOS	
		AM Peak Hour	PM Peak Hour
1	South Capitol Street and I (Eye) Street SE (Left)	B	B
2	South Capitol Street and I (Eye) Street SE (Right)	B	B
3	Ramps from freeway at South Capitol Street SB	C	C
4	South Capitol Street at M Street SE - SB Intersection	F	C
5	South Capitol Street at M Street SE - NB Intersection	B	C
6	M Street SE at 1st Street SE	B	B
7	M Street SE at New Jersey Avenue SE	B	B
8	M Street SE at 3rd Street SE	A	A
9	M Street SE at 4th Street SE	C	B
10	M Street SE at 8th Street SE	B	B
11	M Street SE at 9th Street SE	B	B
12	M Street SE at 11th Street SE	C	D
13	Virginia Avenue SE EB at 5th Street SE	C	D
14	SE Freeway off-ramp at 6th St. SE/Virginia Ave. SE EB	B	B
15	Virginia Avenue SE EB at 7th Street SE	A	B
16	Virginia Avenue SE EB at 8th Street SE	C	D
17	Virginia Avenue SE ramp at 8th Street SE	B	B
18	I (Eye) Street SE at 8th Street SE	B	B
19	I (Eye) Street SE at Virginia Ave. SE WB/7th St. SE	A	B
20	I (Eye) Street SE and Virginia Ave. SE WB at 6th St. SE	A	C

Table 4-16 (continued)
Existing LOS of Signalized Intersections in the General Vicinity of the Project

Location[1]	Intersection Name	LOS	
		AM Peak Hour	PM Peak Hour
21	Virginia Avenue SE WB at 4th Street SE	C	B
22	Virginia Avenue SE WB at 3rd Street SE	C	F
23	G Street SE at 8th Street SE	A	B
24	M Street SE at Isaac Hall Avenue SE	A	C

Notes: [1] See Figure 4-18 for locations of analyzed intersections
EB: eastbound; WB: westbound; SB: southbound; NB: Northbound

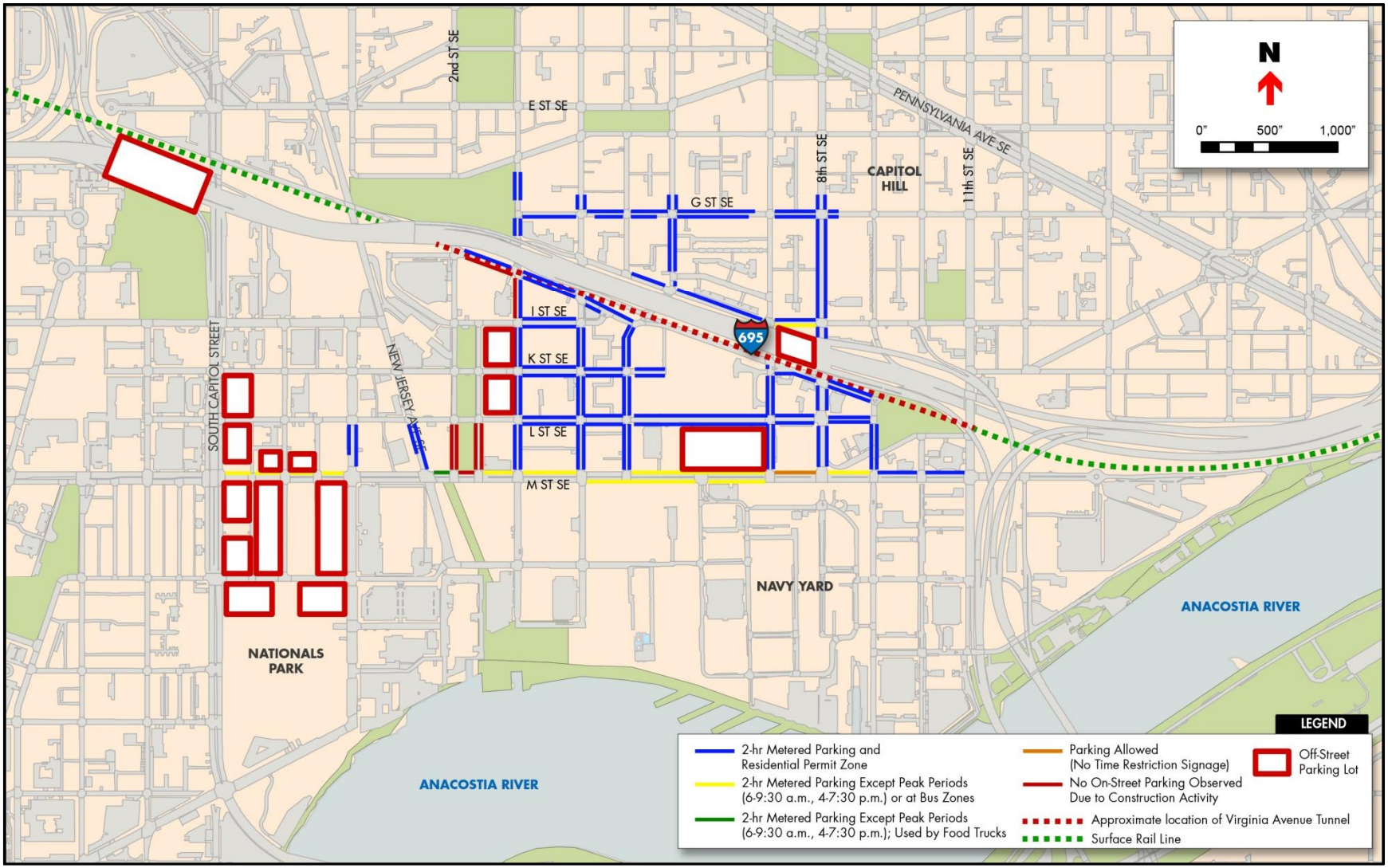
Table 4-17
Existing LOS of Un-signalized Intersections in the General Vicinity of the Project

Location[1]	Intersection Name	LOS	
		AM Peak Hour	PM Peak Hour
A	M Street SE at 7th Street SE	N/A[2]	N/A[2]
B	Virginia Avenue SE at 2nd Street SE	A	A
C	Virginia Ave. SE at 3rd Street SE, South of I-695	N/A[2]	N/A[2]
D	Virginia Ave. SE at 4th Street SE, South of I-695	N/A[2]	N/A[2]
E	Virginia Ave. SE at 9th Street SE	A	A
F	G Street SE at 4th Street SE	A	A
G	G Street SE at 6th Street SE	B	A
H	G Street SE at 7th Street SE	A	A
I	E Street SE at 6th Street SE	B	A
J	D Street SE at 6th Street SE	B	A

Notes: [1] See Figure 4-18 for locations of analyzed intersections
[2] The HCM procedures does not calculate an overall LOS for two-way stop controlled intersections.

The operational analysis indicates that in general, the un-signalized intersections operate at acceptable LOS. Similarly, that analysis presents that the approaches to these un-signalized intersections also operate under acceptable LOS, with the exception of the southbound approach to the 7th Street SE and M Street SE intersection, which operates at LOS F in the AM

Figure 4-19
Parking Locations in the General Vicinity of the Project



and LOS E in the PM. Field observations confirmed the poor condition of traffic operations on this approach.

4.15.4 Parking

On-street parking is available on most streets in the general vicinity of the LOD. In general, on-street parking spaces are mostly of residential permit parking (zone 6), with a two-hour parking limit for non-resident parking. In most cases, non-residential parking is controlled by variable rate meters (see photograph).

Some streets, such as M Street SE, prohibit on-street parking during rush hours to allow the usage of the parking lane as travel lanes. On some blocks, no signage is provided indicating any restrictions or limitations in allowed parking time. Figure 4-19 show the status of on-street parking in the general vicinity of the LOD. On Virginia Avenue SE, residential and metered parking is provided between 2nd and 5th Streets SE. Between 8th and 9th Streets SE, no parking signage is provided.

Variable Rate Parking Meter

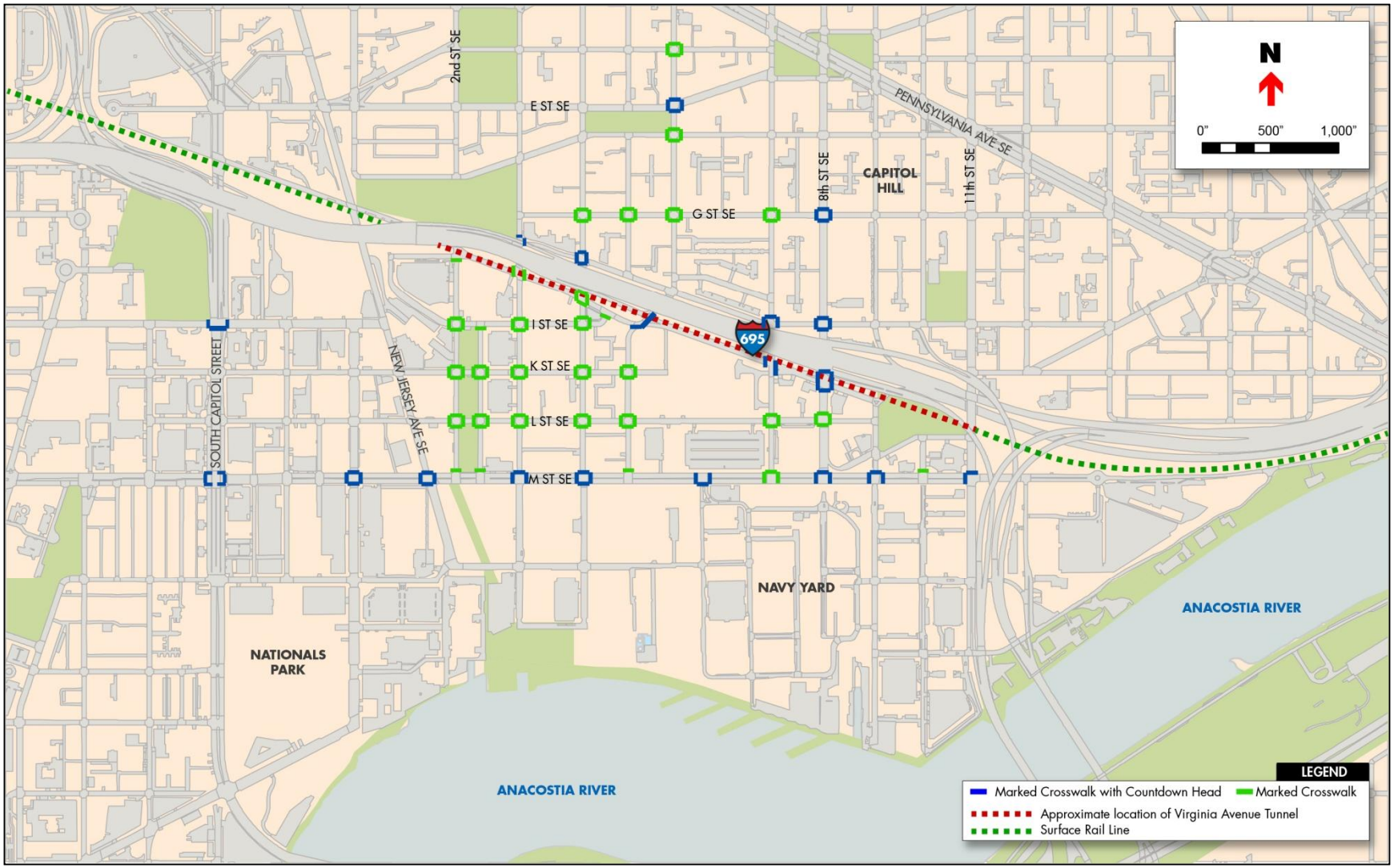
In addition to on-street parking zone, Figure 4-19 also identifies off-street parking lots open to the general public in the general vicinity of the LOD. Many of these lots not only provide service to residents and employees working in the area, but they also provide additional parking for attendees of special events, such as Washington Nationals baseball games and the Marine Band summer concerts.

4.15.5 Pedestrian and Bicycle Facilities

Pedestrian

The District contains over 1,600 miles of sidewalks. Virginia Avenue SE between 2nd and 9th Streets SE provides sidewalks along this entire length. However, the north side of the street, along I-695 lacks sidewalks on most street blocks. Cross walks are provided at every intersection from 2nd to 8th Street SE as shown on Figure 4-20.

Figure 4-20
Crosswalks in the General Vicinity of the Project



Bicycle

The District seeks to develop a comprehensive network of bicycle facilities for recreational and non-recreational use. The District contains on-road bicycle lanes (56 miles); signed routes (84 miles); and off-road trails (56 miles) (DDOT Bicycle Program, July 11, 2012).

Bicycle facilities in the general vicinity of the LOD are shown on Figure 4-21. Bicycle lanes are provided on 1st, 4th, 6th, and 11th Streets SE. Figure 4-20 also shows the location of Capitol Bikeshare Stations. These are locations where patrons pick and drop off shared use bicycles.

Proposed the bicycle facilities in the general vicinity of the LOD include:

- Bicycle trail (off-street) along Virginia Avenue SE from 2nd Street SE (Garfield Park area) to 11th Street SE with an eventual connection to the Anacostia Waterfront;
- Bicycle trail along 2nd Street SE connecting the Anacostia Trail with Garfield Park; and
- Extension of bicycle lanes on 11th Street SE.

4.15.6 Transit Facilities and Services

The Washington Metropolitan Area Transit Authority (WMATA) operates numerous transit services in the general vicinity of the LOD. Figure 4-22 shows these services. The Green Line of the WMATA Metrorail has an underground station (Navy Yard Station) with two entrances located along M Street SE, one at New Jersey Avenue SE and the other at Half Street SE. Other nearby Metrorail stations include Capitol South (1st and C Streets SE) and Eastern Market (Pennsylvania Avenue and 7th Street SE), which are located north of the LOD. Both of these stations are used by Orange and Blue Metrorail lines.

The Metrobus routes operated by WMATA in the general vicinity of the LOD include (see Figure 4-22):

- Routes P1 and P2, which operates along M Street SE during weekdays;
- Routes 90, 92, and 93 (U Street-Garfield Line), which operate along 8th Street SE and M Street SE during weekdays and weekends;
- Routes V7, 8, and 9 (Minnesota Avenue M Street Line), which operate along M Street SE during weekdays and weekends;
- Routes A42, A46, A48, which operate along M Street SE during weekdays and weekend as an afterhours service when Metrorail is not operating;
- Route A9, which provides rush hour service from southern Anacostia to L'Enfant Metrorail Station, and travels along South Capitol Street and M Street SW; and
- Route P6 (Anacostia-Eckington Line), which operates along M Street SE and was re-routed and re-scheduled in June 2012 from a route that operated on Virginia Avenue SE.

Metrobus routes traveling on I-695 are not are not identified because they do not directly service the areas surrounding the Project.

Figure 4-21
Bicycle Facilities in the General Vicinity of the Project

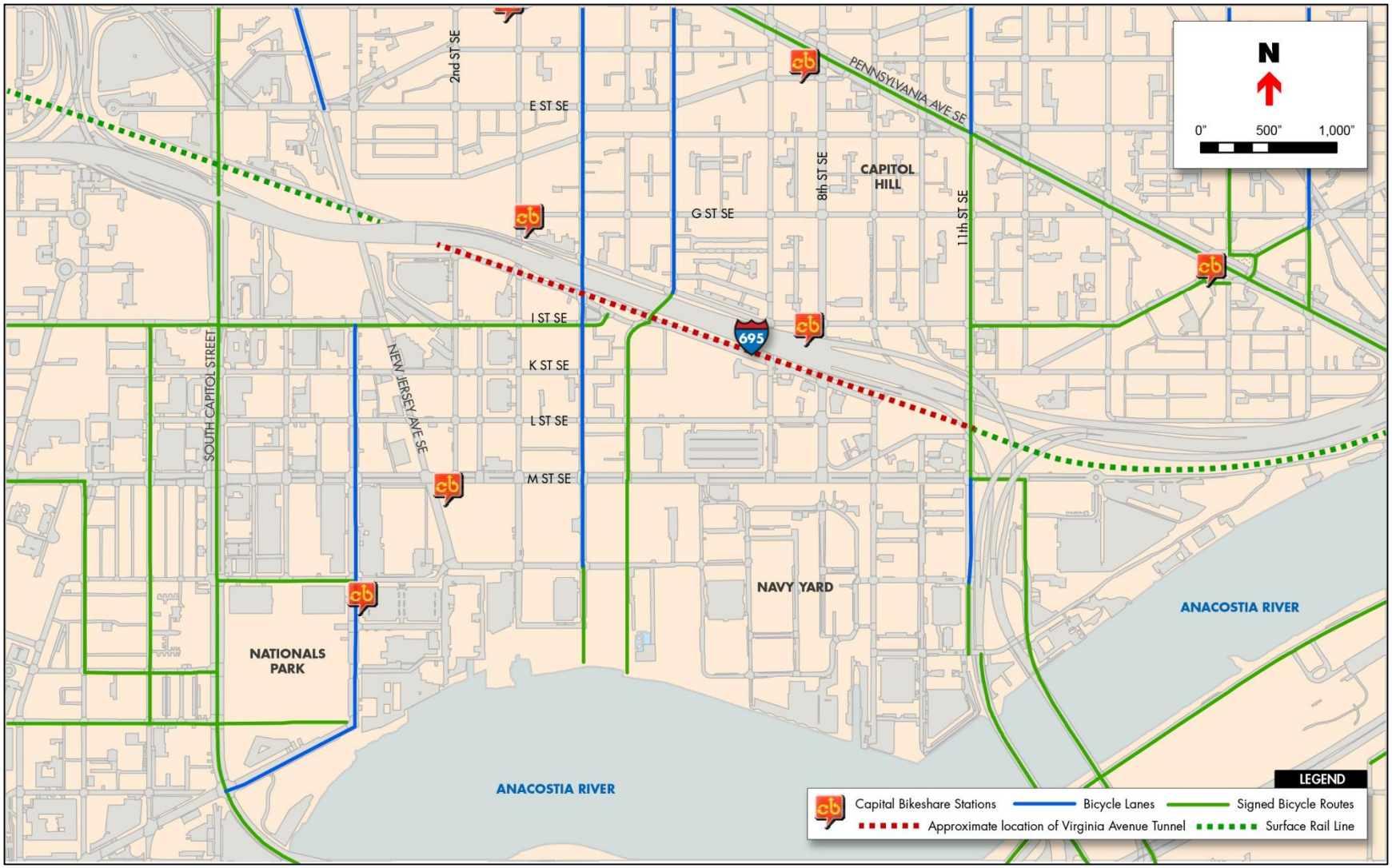
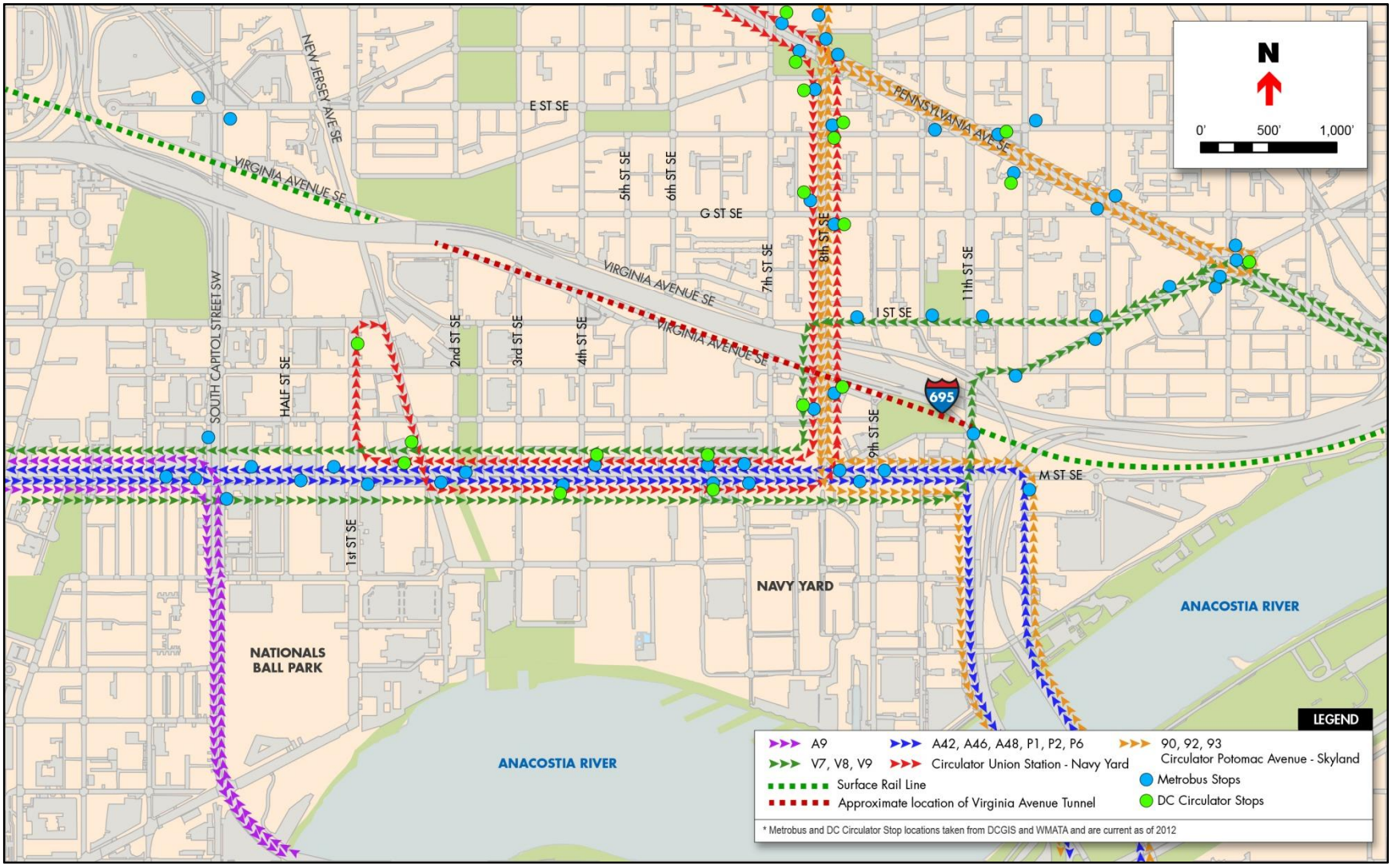


Figure 4-22
Metrobus Routes in the General Vicinity of the Project



DDOT operates two DC Circulator routes that pass through the LOD:

- Union Station - Navy Yard: this route links Union Station with the Navy Yard Metrorail Station; and
- Potomac Avenue – Skyland: this route links Potomac Avenue Metrorail Station to Skyland area in Anacostia.

In addition, commuter bus services operate in the area, including companies such as the OmniRide, linking Prince William County to the District of Columbia (including the Navy Yard area).

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